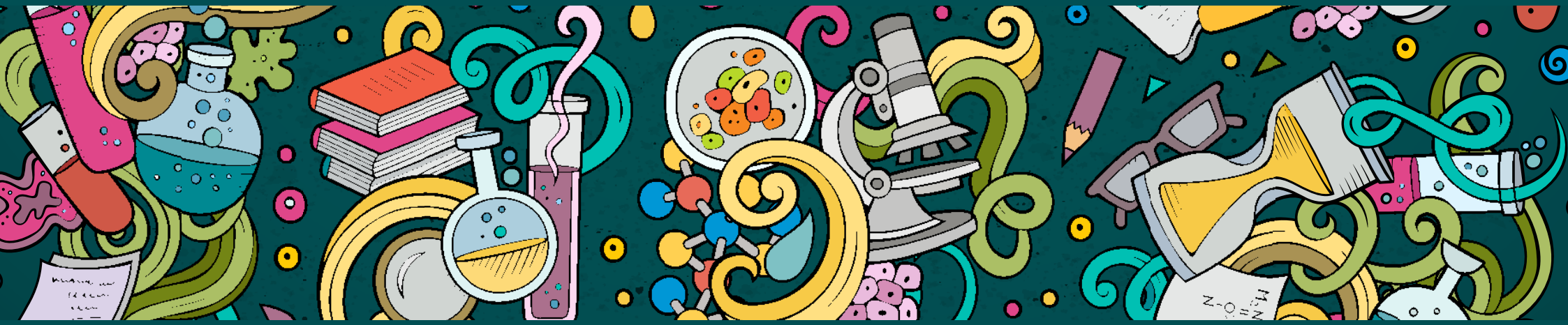
CHEMISTRY EXPERIMENTS
For kids at home



If you've got the next Rosalind Franklin and Dmitri Mendeleev growing up in your household, then use our seven chemistry experiments to keep them entertained for the entire week. One experiment a day keeps the boredom away!

All activities can be performed with easy-to-find ingredients. Please use adult supervision.

BÜCHI

ACIDS

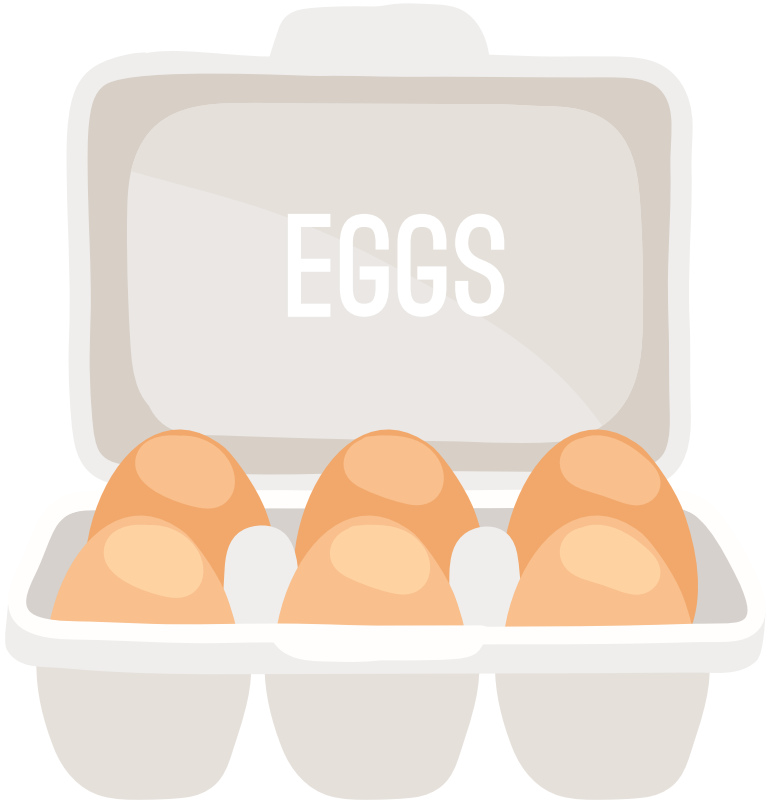
Rubber egg

Equipment & Ingredients:

- Hard-boiled egg (unpeeled)
- Glass of vinegar

Method:

1. Place egg into glass full of vinegar. You should see bubbles beginning to form on the egg.
2. Leave the egg undisturbed for about a day. Some scum should start to form
3. Take the egg out of the vinegar and rinse with water. The shell should rub off.
4. Poke the egg with your finger and squeeze it gently. It is now a rubber egg.



Science check

Vinegar, a type of acid, chews away calcium carbonate, a chemical found in the egg shell. Calcium carbonate is what makes the shell hard, so without it, the “naked” egg feels soft and rubbery. All the bubbles you saw were actually carbon dioxide gas arising from the chemical reaction between the calcium carbonate in the egg shell and the acidic vinegar.
If you find small rocks and drop them in vinegar, you might also see bubbles appear as they did on the egg. The presence of bubbles indicates that calcium carbonate is probably present in your rocks.

DENSITY

Density Column

Equipment & Ingredients:

- Honey
- Liquid dishwashing soap
- Water
- Vegetable oil
- Rubbing alcohol
- Food colouring
- Glass container

Method:

1. Add food colouring to your water.
2. Add a different food colour to your rubbing alcohol
3. Pur honey into center of your glass container.
   Try to avoid letting the honey run down the side of the container.
4. Make sure there is an even layer before you add the next liquid.
5. Carefully pour the liquid soap down the side of the container.
6. Carefully pour the water down the side of the glass container.
7. Carefully pour the vegetable oil down the side of the container.
8. Give oil extra time to settle.
9. Lastly, carefully add rubbing alcohol to the glass container.

Science check

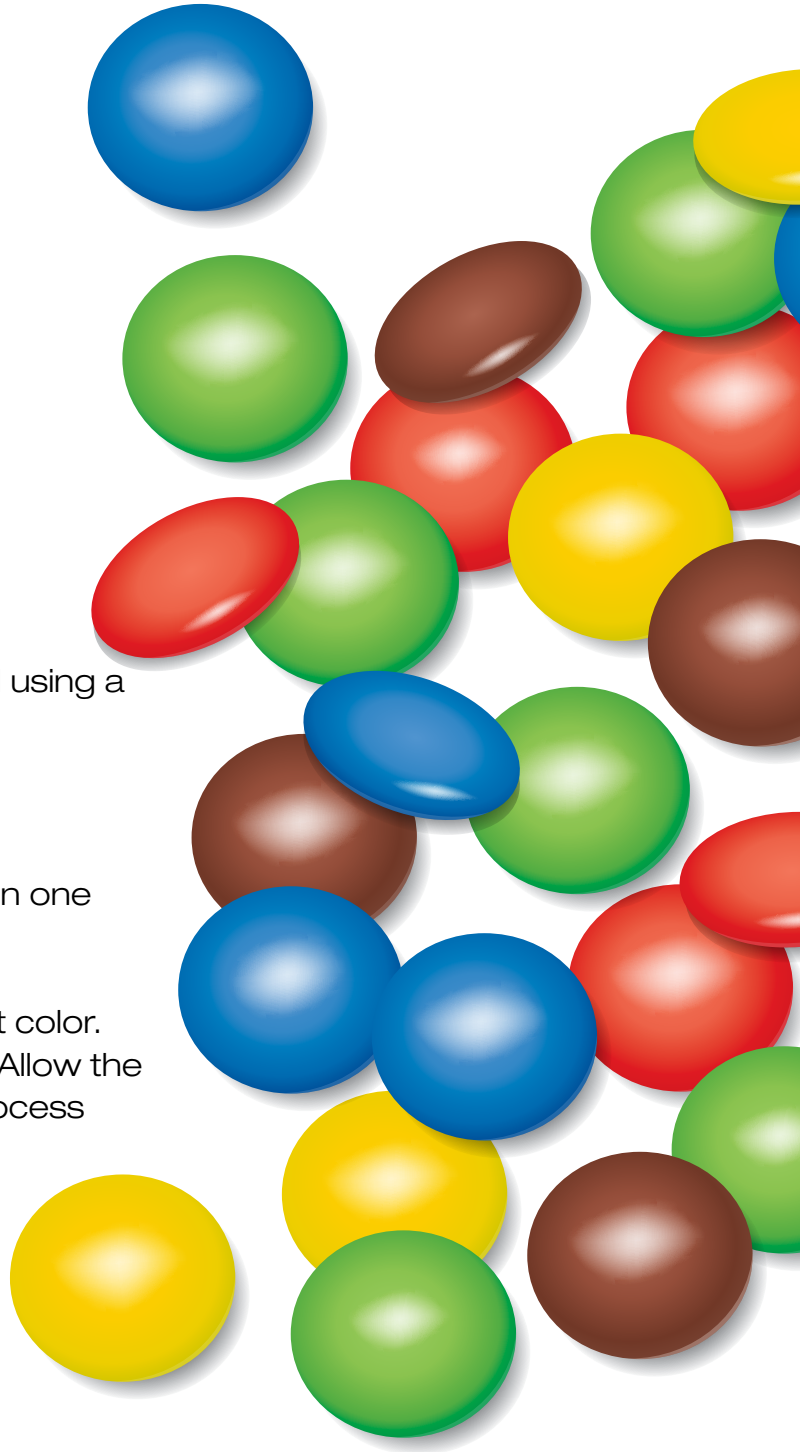
The heaviest liquids have the most mass per unit volume. This also means they have the highest density. This is why you added the honey first and the alcohol last. The liquids in the column do not mix either because they repel each other (like oil and water) or because they are thick or viscous. Overtime, some of the liquids of your column will mix together.

CHROMATOGRAPHY

Candy chromatography

Equipment & Ingredients:

- Skittles or M&M candies
- Coffee filter
- Tall glass
- Water
- Table salt
- Pencil
- Toothpicks
- Plate or foil
- Pitcher or empty 2-liter bottle
- Measuring cups/spoons



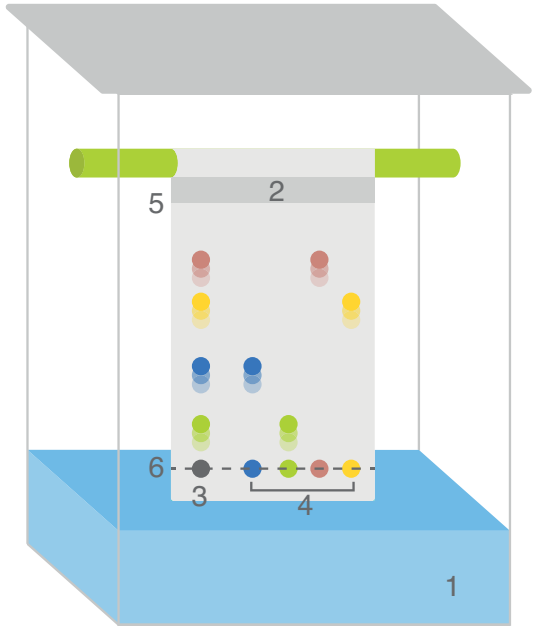
Method:

1. Measure and cut a 8x8 cm square from a coffee filter.
2. Using a pencil, draw a 1 cm line ½ from the edge of one side of the paper. Avoid using a pen, as the ink would run with the experiment.
3. Make six pencil dots, one dot for one candy, along this line, about 0.5 cm apart. Underneath each dot, label the color of the candy you will test on that spot. Try B for blue, G for green to save writing space.
4. Place 6 drops of water an equal distance apart on a plate or piece of foil. Position one candy of each color on the drops. Give the color some time (at least a minute) to get into the water. Remove the candy.
5. Dip a toothpick into a color and dab the color onto the pencil dot labeled for that color. Use a clean toothpick for each color. Try to keep each dot as small as possible. Allow the filter paper to dry, then go back and add more color to each dot. Repeat the process three more times, so that you have lots of colour for each sample.
6. When the paper is dry, fold it in half with the color sample dots on the bottom.
7. Prepare a salt solution by mixing 1/8 teaspoon of salt and three cups of water in a clean pitcher or 2-liter bottle. Stir or shake the solution until it is dissolved. This will produce a 1% salt solution.

CHROMATOGRAPHY

Candy chromatography

8. Pour the salt solution into a clean tall glass so that the liquid level is 0.5 cm.
9. It's time to place your coffee filter paper in the salt solution. You want the level to be below the sample dots. You can check this by holding the paper up against the outside of the glass. Pour out a little salt solution if the level is too high. Once the level is correct, stand the filter paper inside the glass, with the dot side down and the edge of the paper wetted by the salt solution.
10. The salt solution will be drawn up the paper by itself.
11. When the salt water is 0.5 cm from the top edge of the paper, remove it from the glass and place it on a clean, flat surface to dry.
12. When the coffee filter is dry, compare the results of chromatography for the different candy colors. Which candies contained the same dyes? These are the candies that have corresponding bands of color. Which candies contained multiple dyes? These are the candies that had more than one band of color.



Science check

Capillary action draw sthe salt solution up the paper. As it passes through the dots, it begins to separate the dyes. You will notice that some colors contain more than one dye. The dyes separate because some dyes are more likely to stick to the paper, whereas other dyes have a higher affinity for the salt water. In paper chromatography, the paper is called the "stationary phase" and the liquid (salt water) is called the "mobile phase."

ACIDS & BASES

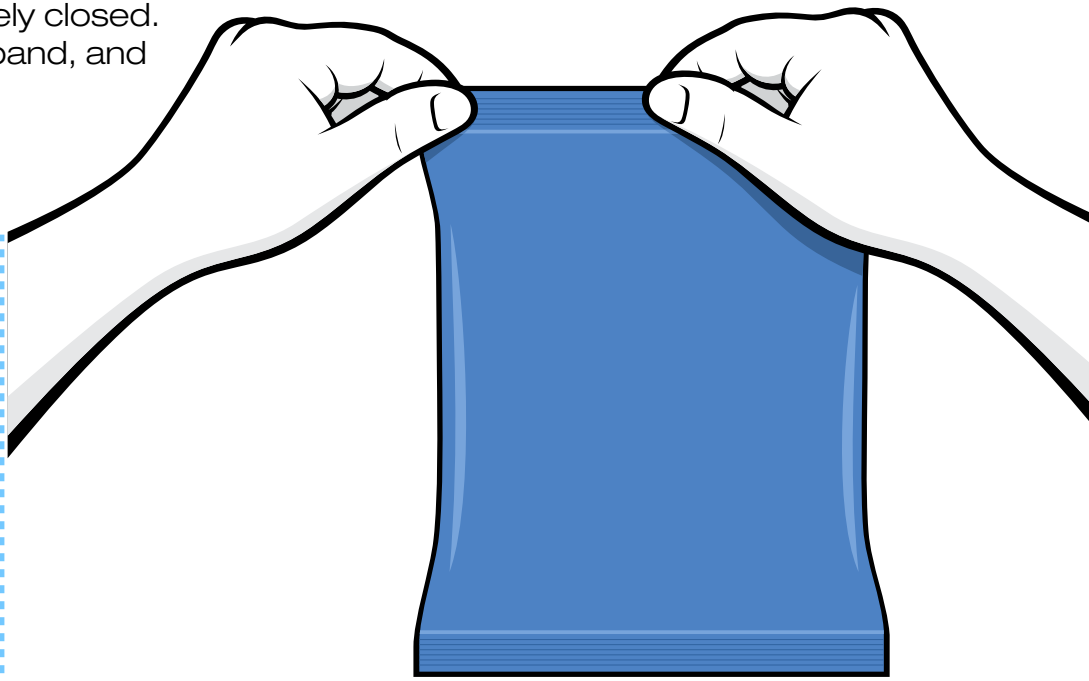
Exploding Lunch Bag

Equipment & Ingredients:

- One small (sandwich size) zip-lock bag or freezer bag
- Baking soda
- Warm water
- Vinegar
- Measuring cup
- A tissue

Method:

1. Perform this experiment in the kitchen sink.
2. Pour 1/4 cup of warm water into the bag.
3. Add 1/2 cup of vinegar to the water in the bag.
4. Put 3 teaspoons of baking soda into the middle of the tissue
5. Wrap the the baking soda up in the tissue by folding the tissue around it.
6. You will need to work fast now – partially zip the bag closed but leave enough space to add the tissue with the baking soda. Put the tissue with the baking soda into the bag and quickly zip the bag completely closed.
7. Put the bag in the sink and step back. The bag will start to expand, and expand, and if all goes well…POP!



Science check

The baking soda and the vinegar eventually mix (the tissue is there to buy you some time to get the bag closed). When they do mix, you create an ACID-BASE reaction and the two chemicals work together to create a gas, in this case carbon dioxide. Gases need a lot of room, so as the carbon dioxide starts to fill the bag, it keeps going until the bag can no longer hold it any more and the bag explodes!

BASES

Invisible Ink

Equipment & Ingredients:

- Baking soda
- Paper
- Water
- Light bulb (heat source)
- Paintbrush or swab
- Measuring cup
- Purple grape juice (optional)

Method:

1. Mix equal parts water and baking soda.
2. Use a cotton swab, toothpick, or paintbrush to write a message onto white paper, using the baking soda solution as “ink.”
3. Allow the ink to dry.
4. One way to read the message is to hold the paper up to a heat source, such as a light bulb. You can also heat the paper by ironing it. The baking soda will cause the writing in the paper to turn brown. Avoid applying too much heat to eliminate risk of ingiting paepr
5. Another method is to paint over the paper with purple grape juice. The message will appear in a different color.

Science check

The baking soda solution slightly disrupts the cellulose fibers in the paper, damaging the surface. When heat is applied, the shorter, exposed ends of the fibers darken before the undamaged sections of the paper. The grape juice method is based on a different principle. Here, the grape juice acts as a pH indicator that changes color when it reacts with the sodium bicarbonate of baking soda, which is a base.

POLYMERS

Plastic milk

Equipment & Ingredients:

- Milk
- White vinegar
- Microwave
- Strainer
- Coffee filter (optional)
- Food colouring (optional)
- Paper towel (optional)
- Small bowl (optional)
- Acrylic paint (optional)

Method:

1. Microwave 1 cup of milk for two minutes
2. Add 4 teaspoons of white vinegar
3. Mix for 1 minute. The mixture will be a little clumpy.
4. Use a strainer to separate the clumps for the liquid. You can throw away the liquid.
5. To get more plastic out of the milk, use a coffee filter to strain out the clumps from the liquid.
6. Add 1-2 drops of food colouring into a small bowl.
7. Move the clumps into the bowl and mix with food colouring.
8. Place the mixture on a paper towel.
9. Knead mixture to remove excess water.
10. Mold mixture into whatever shape you'd like.
11. Leave it to dry overnight, then turn it over and continue to dry for 2 days to 1 week. Once ready, the material will be solid hard. You can even paint it if you want.

Science check

The protein in the milk, casein, does not mix well with the acidic vinegar, causing it to clump up. Casein is a polymer and vinegar makes it squiggle, unfold, stretch out and its molecules grab onto one another, turning into "plastic".

FATS

Colour symphony

Equipment & Ingredients:

- Flat tray (like a cookie baking tray)
- Food coloring (at least 3 different colors)
- Whole milk – low fat milk will not work for this experiment
- Liquid soap used for washing dishes

Method:

1. Carefully pour the milk into the tray so that it just covers the bottom of the tray.
2. Add 6-8 drops of different coloured food colouring ont the milk in different spots.
3. Add about five drops of the liquid soap onto the drops of food colouring and enjoy the show.

Science check

The purpose of the dish soap is to attack the fat in the milk and break it down. When you drop the liquid soap onto the tray, it breaks down the fat in the milk. While the fat is breaking, it causes the colours the scatter, mix and create a colourful display.

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