

Chemical Fun: Mixing and Unmixing

Aim: To learning about chemistry; for children in intermediate grades

From: Department of Chemistry, Dalhousie University www.chem.dal.ca

Write your observations on this page.

Items Required:

Vinegar	Plastic cups	Salt	Optional: Hot plate
Baking soda	Corn starch	Large bar magnet	and Pyrex
Balloons	Water jugs	Smarties	measuring cup
Test tubes	Detergent	Marker pens	
Stoppers for test tubes	Food colouring	Scissors	
Coffee filter paper	Sand	Pencils	
Stir sticks	Iron filings		

Mixing:

Mix 1. Place a few mL of vinegar in a test tube, and then add a small amount of baking soda. Immediately place balloon over mouth of test tube. *Observations and explanation:*

Mix 2. On a piece of coffee filter paper (cut 2 cm x 10 cm), mix together food colouring as follows. Do 3 mixes, one on each of 3 separate pieces of paper (each labeled in pencil with the colours used), by placing 1 cm from the edge of the paper, 1 or 2 drops of each colour on top of each other to allow mixing: (1) red + green, (2) red + blue, (3) blue + yellow.

Observations: (1) red + green =

(2) red + blue =

(3) blue + yellow =

Mix 3. Using a small plastic cup, mix together a few mL of sand with a few mL of salt, with a few mL of iron filings. Stir with a stir stick. *Observations:*

Mix 4. Fill a plastic cup about 1/3 full of cornstarch. Add enough water to just moisten. Mix with a stir stick. *Observations:*

Mix 5. Pour water into a test tube until $\frac{1}{4}$ full. Then add about the same amount of oil. Secure the top with a stopper, and shake. *Observations:*

Now open the top and add one drop of detergent. Stopper and shake again. *Observations:*

Unmixing:

Unmix 1. Place water in a clean plastic cup to a height of about 0.5 cm. Take each of the filter papers from Mix 2, and, one by one, put end nearest the food colouring into the water, and let sit. While waiting, you can move on to another experiment and come back to this later. *Observations:*

(1) red + green:

(2) red + blue:

(3) blue + yellow:

Unmix 2. Cut 3 more pieces of coffee filter paper to 2 cm x 10 cm (approximately). Dampen a Smartie, and rub it on the filter paper, about 1 cm from the bottom. Do one filter paper for each of 3 colours (red, green, brown). Place water in a clean plastic cup to a height of about 0.5 cm. Take each of the filter papers, and, one by one, put the end nearest the Smartie colouring into the water, and let sit. While waiting, you can move on to another experiment and come back to this later. *Observations:*

red:

green:

brown:

Unmix 3. Cut 3 more pieces of coffee filter paper to 2 cm x 10 cm (approximately). Using a marker pen, make a mark on the filter paper, about 1 cm from the bottom. Place water in a clean plastic cup to a height of about 0.5 cm. Take the filter paper and put the end nearest the marker ink into the water, and let sit. Repeat if you have more marker pens of different colours. While waiting, you can move on to another experiment and come back to this later. *Observations:*

Unmix 4. Take the plastic cup from Mix 3, and try to separate the sand, iron and salt. First, stir the contents with a large magnetic stir bar. *Observations:*

Now, add a few mL water and swirl. *Observations:*

Carefully pour off some of the water layer into another plastic cup. Leave to sit for some days until it is dry. (Optional: With the help of an adult, pour this into a Pyrex container, and place it on the hot plate. Heat carefully until dry.) *Observations:*

Explanatory Notes:

Chemists spend a lot of time mixing things together to get new types of chemicals.

Mix 1: When vinegar and baking soda are mixed together, they react to give off carbon dioxide gas (CO₂). This gas causes fizzing and inflates the balloon. When you bake, the baking soda reacts with acids in the food (e.g. cake batter) to give off carbon dioxide that makes the cake rise while baking.

Mix 2: When colours are mixed together, they can produce new colours.

Mix 3: These solids all seem to mix together, but, observed close up, they are all individual grains.

Mix 4: Water and corn starch forms an unusual mixture. When you roll it between your hands, it feels like a solid, but when you let a ball sit on your hand, it looks like a liquid.

Mix 5: Oil and water don't mix very well. When you add a drop of detergent, this helps them mix. That's because the detergent molecules have one end that likes water, while the other end likes oil, bringing them together. That's why we use soap or detergent to wash our hands and clothes. Small amounts of chemicals similar to detergent help keep together the oil and water layers of salad dressing.

Chemists also try to separate things so that can see what is present.

Unmix 1: The water and filter paper work together to separate the colours. Some separate better than others.

Unmix 2: Again, the water and filter paper work together to separate the colours. Some colours are "pure" and some are composed of several colours.

Unmix 3: Once again, the water and filter paper work together to separate the colours. This works best with water-soluble markers. Again, some colours are "pure" and some are composed of several colours.

Unmix 4: Iron is attracted to the magnet and can be separated easily. Salt dissolves in water but sand does not. When the water is allowed to evaporate, the salt can be seen again.

If you completed and enjoyed these experiments, you can consider yourself to be a junior chemist!

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