

CONTAIN YOUR EXCITEMENT



STUDENT WORKBOOK



CHEMISTRY – IT'S IN THE BAG!

Big changes can happen in small spaces. Watch what happens when you mix calcium chloride and sodium bicarbonate in a bag!

I

SO MANY CHANGES, SO LITTLE SPACE

This experiment will get you thinking about how changes on a microscopic level lead to changes we can observe.

WHAT YOU NEED:

FROM THE KIT:

- Baking soda
- Bromothymol blue
- Calcium chloride
- Goggles
- Graduated cup
- Measuring scoop

- Pipet
- Spring scale
- Stir rod
- Vial
- Zip-close bag

OTHER ITEMS:

- Water

WARNING! DO NOT EAT OR DRINK anything in this kit.
WARNING! Calcium chloride and bromothymol blue are minor skin and eye irritants.



WHAT TO DO:

STEP 1

Fill the plastic vial about three-quarters full with water.



STEP 2

Shake some calcium chloride into the measuring scoop until it's full. Pour the calcium chloride from the scoop into the water, then stir with the stir rod for about 30 seconds.

STEP 3 Feel the outside of the vial and write your observations in the “Many Changes Observation Table” on page 5.



STEP 4

Poke the hook of the spring scale through the middle of the top of the bag (above the zip seal). Take the hook out for now and open the bag.

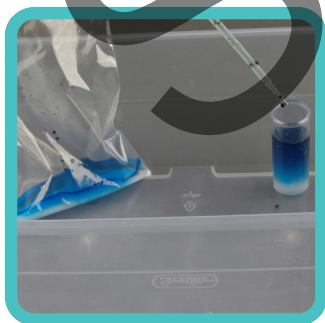
STEP 5 Fill the graduated cup with 30 mL of water. Then, pour the water into the bag.

STEP 6 Make sure the scoop is clean (wash and dry if it you need to). Add 1 scoop of baking soda to the water in the bag.



STEP 7

Gently squeeze the bag until the powder is fully dissolved.



STEP 8 Add a full pipet (3 mL) of bromothymol blue to the mixture in the bag, then add a full pipet of bromothymol blue to the mixture in the vial. Mix evenly and record your observations in the table. Note: Bromothymol blue is an indicator that shows how acidic or basic a substance is. If it's blue, it's basic. If it's green, it's neutral. If it's yellow, it's acidic.

STEP 9 Place the bag upright in the sink so that it doesn't spill (you can hold it with one hand).



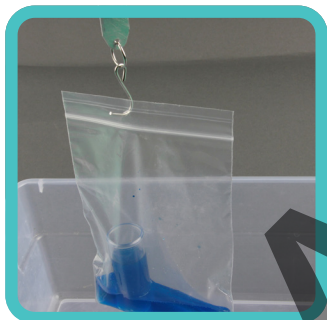
STEP 10

Carefully, without tipping it over, set the vial with the calcium chloride and water into the bottom of the bag.



STEP 11

Squeeze out extra air from the bag. Close it.



STEP 12

Hook the spring scale through the hole you made earlier. Allow the bag to freely hang from the scale so you can read the weight. Record it in the table.



STEP 13 Without opening the bag, tip over the vial so that the two liquids can mix. Observe the bag and record your observations in the table. Note: If the bag seems like it's going to pop, quickly read the weight and open the bag (Steps 14 and 15).

STEP 14 With the bag still closed, record the weight.

STEP 15 Open the bag. After a few seconds, record the weight.

STEP 16 Observe the color of the liquid.

STEP 17 Rinse the contents of the bag down the sink with plenty of water. Throw away the bag. Rinse the vial, cup, scoop, and stir rod. Set them aside for future activities.

Many Changes Observation Table

Step	Type of Observation	Record the Observation
3	Observe the vial (feel it after adding calcium chloride)	
7	Observe the bag (feel it after adding baking soda)	
8	Observe the bag and vial after adding bromothymol blue	(bag) (vial)
12	Weight of the bag (before mixing)	grams
13	What the contents of the bag look like after mixing	
14	Weight of the bag (closed, after mixing)	grams
15	Weight of the bag (after mixing and opening)	grams
16	Color of the liquid in the bag (after mixing and opening)	



THINK ABOUT IT!

1. What happened to the temperature of water when you:
- a. dissolved calcium chloride? _____
 - b. dissolved baking soda? _____
 - c. mixed the two liquids together in the bag? _____
2. Do you think you made new substances when you:
- a. dissolved calcium chloride? _____
Why? _____
 - b. dissolved baking soda? _____
Why? _____
 - c. mixed the two liquids together in the bag? _____
Why? _____
3. The weight didn't change when the reaction happened and the bag was closed. Why do you think that is? _____
4. The weight changed when you opened the bag. Why do you think that is? _____
5. What are two questions you have about what happened in this experiment? _____

GLOSSARY

Atom – the smallest piece of a chemical element that is still that element.

Boiling point – the temperature at which a substance changes from liquid to gas.

Chemical change – something that happens to a substance or object that changes the identity of the original substance or object.

Chemical property – a quality of a substance or object that you can only observe by doing a chemical change to it.

Chemistry – the study of matter, including its properties and changes.

Closed system – a system in which matter cannot go in or out.

Combustibility – the ability of a substance to catch fire at high temperatures.

Compound – a type of matter that has only one type of particle, but each particle is two or more atoms bonded together in the same way every time.

Density – the amount of mass in a certain volume.

Element – a type of matter that has only one kind of atom.

Dissolving – the even mixing of a solid into a liquid.

Flammability – the ability of a substance to catch fire at normal temperatures.

Fossil fuels – compounds made mostly of carbon and hydrogen that formed naturally from ancient plant matter and can be burned to release large amounts of energy.

Gas – a state of matter in which particles are very far apart, move faster than in a liquid, and are very disorderly.

Isolated system – a system in which neither matter nor energy can go in or out.

Law of Conservation of Mass – the total mass of a system is the same before and after a change.

Liquid – a state of matter in which particles are further apart than in a solid, are free-flowing, and move faster than in a solid.

Mass – the amount of matter in an object.

Matter – anything that takes up physical space.

Mixture – a type of matter that has more than one kind of particle.

Molecule – a group of atoms bonded together.

Open system – a system in which matter can come in or go out.

Particles – the smallest pieces of matter, including atoms and molecules.

pH – how acidic or basic a substance is.

Phase change – the change between solid, liquid, or gas caused by an increase or decrease in temperature.

Physical change – something that happens to a substance or object that doesn't change the identity of that substance.

Physical property – a quality of a substance or object that can be observed using the five senses or by simple measurement.

Products – the substances present after a chemical reaction.

Reactants – the substances present before a chemical reaction.

Reactivity – how likely it is that a substance will make new substances when it interacts with other substances.

Solid – a state of matter in which particles have an orderly arrangement, are close together, and are vibrating.

Solubility – how well something dissolves in something else (usually water).

Surroundings – the rest of the universe that is not the system being studied.

System – a set of objects or substances being studied.

Thermal energy – the energy of moving particles.

Volume – the amount of space something takes up.

SAMPLE

ACCELERATE



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Kit	SU-CONTYR
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