KITCHEN CHEMISTRY

Chemistry is the study of matter. Matter is anything that takes up space, so it is all around us! Normally we experience matter in its three basic states: solid, liquid, and gas. Scientists do experiments to learn more about matter and the world around us. Have fun trying some of these experiments at home. Remember to always ask an adult for permission before starting your experiments. They will make sure you have everything you need and that they are safe for you to do. *** Make sure to do most of these experiments in the kitchen, since they are messy!***

Super Gel

Materials

Disposable diaper(s)
Scissors
Newspaper
Salt
Gallon size zipper-lock bag
Water
Spoon

Instructions

Place a new diaper on the piece of newspaper. Carefully cut through the inside lining, remove all the cotton-like material and put it in the bag. Scoop up any of the powder that may have spilled onto the paper and pour it into the bag with the stuffing. Blow a little air into the bag to make it puff up like a pillow, then seal the bag. Shake the bag for a few minutes to separate the powder from the stuffing. Carefully remove the stuffing from the bag. Pour the remaining powder into a plastic cup. Try adding several small amounts of water. Observe the gel that the powder and water create. Turn the cup upside-down and see how the gel has solidified.

* Experiment some more by adding a teaspoon of salt and stir with a spoon. Watch what happens.

* When done with the gel, make sure to toss it in the trash! Don't wash it down the drain!

How does it work?

The secret water-absorbing powder in a diaper is a superabsorbent polymer called sodium polyacrylate. Superabsorbent polymers expand tremendously when they come in contact with water because they act like giant sponges. Sodium polyacrylate can absorb 800 times its weight in water! If you added salt to the gel, you may have noticed that the gel changed into a goo. Salt changes the gel's water-holding abilities.

Play Dough

Materials

1 cup cold water
3 cups flour
2 Tbsp cornstarch
Bowl
1 cup salt
2 tsp vegetable oil
2 Tbsp food coloring
Spoon

Instructions

Mix the water, salt, oil and food coloring in a bowl. Gradually add the flour to the mixture and knead it together to the consistency of bread dough. Mix in the cornstarch by kneading. Play!

How is this science?

Scientists have to be very careful how they measure and mix the different materials they use in their experiments. Even the slightest change in an amount used can change the whole experiment!

Seltzer Rockets

Materials

Clear film canister with a snap-on lid (Fuji® brand works best)
Seltzer tablets (Alka-Seltzer® or equivalent)
Water
Safety glasses or sunglasses

Instructions

IMPORTANT: This experiment requires you to wear protective safety glasses and should be done outdoors.

Fill the film canister ½ full with water. Break the seltzer tablet into 4 pieces. Drop 1 piece of seltzer tablet into the film canister and quickly snap on the lid, shake, and set the "rocket" lid side down on a hard surface and step away.

***For your safety, remember the rule of 5! Take 5 big steps away and wait 5 minutes to check your rocket if it doesn't launch.**

How does it work?

When you drop your seltzer tablet in the water, the fizzing you see is the result of a chemical reaction. A chemical reaction is where you mix things together and make something you didn't have before. In this case you make carbon dioxide gas (CO_2). When the lid is on the rocket, the carbon dioxide gas is trapped and pressure starts to build. When the pressure inside of the rocket is greater than the pressure outside, your rocket launches!

3 State Reaction/Lemon Suds

Materials

Lemon (cut into quarters)
1 tsp baking soda
Newspaper or paper towel
1 tsp liquid dish soap
Clear plastic cup

Instructions

In the cup mix the baking soda and the liquid dish soap. Squeeze the lemon into the cup (squeeze hard to get as much lemon juice as possible) and stir the mixture.

When you're finished, this mixture can be poured down the drain or used as a great cleaner.

How does it work?

When the lemon juice combines with the baking soda, a chemical reaction takes place producing carbon dioxide gas (which is trapped by the soap to make the bubbles), water and a small amount of sodium citrate. This is also sometimes called a 3 state reaction because you use a solid (baking soda), a liquid (lemon juice), and the chemical reaction creates a gas (carbon dioxide).

KITCHEN CHEMISTRY

Slime

Materials

½ cup white school glue
¼ cup liquid laundry starch
Plastic zipper-lock bag
Food coloring

Instructions

Pour the school glue into the zipper bag, add a few drops of food coloring and close the bag. Knead until the food coloring mixes thoroughly with the glue. Add the liquid laundry starch to the bag, close and knead for 3-5 minutes. Remove the mixture from the bag and knead for another 1-3 minutes.

* The slime may appear stringy at first; keep kneading until it pulls together.
* If the slime is very sticky, try adding a little more liquid laundry starch.
* Your slime will keep in the closed bag for 3-5 days. When done toss it in the trash.

How does it work?

White school glue is something called a polymer. Polymer means "many molecules", and if we could see those molecules they would be in tiny chains. The liquid laundry starch is something called a cross-linker, which means that it connects the little chains of the white school glue molecules into long chains of molecules when the two are mixed together. That's why the two liquids become a solid.

Oobleck

Materials

¾ cup cornstarch
½ cup water
Bowl or pan
Spoon
Newspaper

Instructions

Cover the experiment space with newspaper. Pour the cornstarch into the bowl or pan. Slowly add the water and stir.

* Experiment by poking, squeezing and picking up your oobleck! You can also try adding more water or cornstarch to change the consistency.
* When done with the oobleck, make sure to toss it in the trash! DO NOT wash it down the drain!

How does it work?

Oobleck is a non-Newtonian fluid - a fluid that defies Sir Isaac Newton's law of viscosity. Viscosity is the measurable thickness or resistance to flow in a fluid. Honey is an example of a liquid that has a high resistance to flow. Newton stated that the viscosity of a fluid can be changed only by altering the fluid's temperature. For example, honey flows more easily when you warm it up and becomes very thick when it gets cold. A non-Newtonian fluid like oobleck has the same dependence on temperature, but its viscosity can be changed by applying pressure. When you squeeze a handful of oobleck, its viscosity increases so it acts like a solid. When you release the pressure, the oobleck behaves just like a liquid!

Liquid Layers

Materials

Tall, narrow, clear cylinder container that holds about 2 ½ cups
¼ cup honey
¼ cup corn syrup
¼ cup maple syrup
¼ cup milk
¼ cup dish soap
¼ cup vegetable oil
¼ cup rubbing alcohol
¼ cup lamp oil
Metal nut or bolt
Popcorn kernel
Board game die
Grape tomato
Plastic bead
Soda cap
Ping pong ball

** To add a colorful effect to the liquids, try mixing in a different color of food coloring to each liquid (except the vegetable or lamp oil)*

Instructions

Pour each liquid SLOWLY into the container, one at a time starting at the top of the list. Make sure that the liquids do not touch the sides of the cylinder while you are pouring. After letting the liquid layers settle, take the various small objects and drop them in order into the cylinder.

How does it work?

Density is basically how much "stuff" is smashed into a particular area, or a comparison between an object's mass and volume. The same amount (volume) of two different liquids can 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). The same goes for the small objects that you dropped into your density column.

Bouncing Bubbles

Materials

Cup
1 cup of distilled water
2 Tbsp liquid dish soap (Dawn® works best)
Pair of inexpensive clean cotton gloves
Small bubble wand
Spoon
1 Tbsp glycerin

Instructions

Slowly stir together the water, dish soap and glycerin in the cup using the spoon. Put on the gloves then blow a bubble with the wand. Try to catch the bubble and bounce it on your hands by holding your hand palm up, flat, and fingers together.

How does it work?

Bubbles will pop when they come in contact with impurities such as dirt and oil, or if they dry out. The bubble solution allows you to bounce the bubbles because the distilled water is already very low in impurities, and the glycerin makes the bubbles stronger. The clean cotton gloves protect the bubbles from your hands which are dry, and covered in dirt and oil even if they look clean.