pH Weird Science

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*Do not touch the pad on the end of the pH test strips. The acids on your skin will affect the test results from your solutions*

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Step 2: Check the color against your color guide provided. Record the results below according to the number that was on the side of the container.

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Cotton Candy Thrombolytic

1 package of cotton candy

Sprinkles sprinkled on top of the cotton candy

1 spray bottle of water labeled “thrombolytic”

tweezers, forks, toothpicks, etc

Cotton candy is like a blood clot with tiny little strands of thrombin, fibrin, and sprinkles we consider blood cells and platelets.

Step 1: Separate the candy blob into separate strands with your tweezers, forks, toothpicks, etc.

Step 2: With your bottle of “Thrombolytic” , spray an even mist over the cotton candy, “Blood Clot” showing how thrombolytic can dissolve a clot even when you are unable to separate the strands manually (like a cardiologist using a balloon or stent)

* you can also use a straw to simulate an angio-balloon going through the clot. The candy is so dense that the straw won’t go through. So your only option is to use the thrombolytic.

Fidgets and Doodles

Play dough in balloons

Wiki sticks

Legos

Small white boards with colored markers

Pipecleaners

Stress squeeze balls

Beads and satin ribbons

Wobble Cushions or Disc-O-sits

Studies have shown that allowing a student to doodle or fidget in the classroom can improve attention and retention of information. Below are just a very few of the HUNDREDS of articles validating those who are distracted learners and fidgeters.

Offer to let your student bring in their own fidget! Just make sure and lay down some ground rules.

* The fidget/doodle must be quiet
* It can’t be so big that it is a distraction to their neighbors

<https://www.nbcnews.com/health/kids-health/fidgeting-movement-helps-improve-focus-kids-adhd-n373406>

<https://www.npr.org/sections/ed/2015/05/14/404959284/fidgeting-may-help-concentration-for-students-with-adhd>

<https://www.webmd.com/add-adhd/childhood-adhd/news/20150421/freedom-to-fidget-helps-kids-with-adhd-learn-study>

Hello My Name Is

Make “badges” with different conditions or medications on them. Examples would be

Supra Ventricular Tachycardia

Labetalol

What are the indications for an OPA?

What are indications for Albuterol?

Have students wear them throughout the day/week and other students get to stop them and ask them about the condition/medication they have.

After being asked multiple times, the student should have a good grasp on the material. Of course, he/she can retaliate and ask other students about THEIR condition/medication. This creates a competition of sorts in addition to calling each other out on information. The person asking about the condition will also have heard the information and hopefully retained it.

**Lambskin Condoms and Hypertonic Fluids**

This is an old experiment that has been done for years and I don’t know who to give credit to.

Lambskin condom

Large clear glass container (a quart sized fruit jar works well)

Large pair of clamps to seal off the opening of the condom and suspend the condom across the mouth of the jar.

Salt and/or baking soda

Food coloring

Water

Fill the jar with room temperature water and add a lot of salt and/or baking soda. Make sure it isn’t too much to not be able to dissolve though. Stir well.

Fill the condom nearly ¾ of the way full of water, add a lot of food coloring (it will get watered down in color so make it dark) and stir. Twist the open end of the condom and clamp off at the very end. Suspend the clamps across the mouth of the jar so the condom is completely or nearly completely submerged in the water.

After an hour, the condom should be less full than when you started and you can see that the clear fluid that the jar held is now tinged with color.

Water follows sodium. Sodium bicarbonate is the chemical name for Baking Soda. Sodium Chloride is the chemical name for Table Salt. By making the solution in the jar HYPERTONIC, the hypotonic fluid from the condom will be drawn in to the HYPERTONIC fluid. In order to track the water movement, the food coloring just makes it easier to see the changes.

Lambskin condoms are semi-permeable membranes. They allow some things to go through but holds in others. This is a great way of showing how fluid and solutes move back and forth.

As an additional note: This can also be used for Sex Education to show that Lambskin condoms are great for preventing pregnancy but does NOT prevent STDS. Sperm are relatively big things and viruses are really small and can go through the pores of the condom. Only latex or polyurethane condoms can prevent both pregnancy AND STDS (but only if used correctly ;) )

Obstetric Simulations

* One-piece all-plastic baby doll
* Canned Green beans or peas – pureed OR a jar of green bean or peas baby food.
* 1 package of cream cheese – softened
* Black cherry jello + one package of unflavored gelatin

Smear the babydoll with a thin layer of cream cheese. This represents the layer of vernix on a term newborn.

For a meconium birth, smear pureed canned green beans or peas over the baby or put a glob of it in the vaginal of your birth simulator (providing your simulator can tolerate “wet” stuff)

For post-partum bleeding, make the black cherry jello as directed on the package and sprinkle in the package of unflavored gelatin in the liquid mixture while still hot. Allow to set up in the refrigerator. The firmer texture and darker color of the jello with additional gelatin added is great for simulating post-partum bleeding and clots and will startle some students who have never seen how much blood the average woman loses after delivery.

pH and Acidosis

* Balloon
* Pop or Water bottle, rinsed out
* Baking Soda
* Funnel that will fit the neck of the bottle and balloon
* Vinegar (any kind will work)
* Water

Measure out about 2 tablespoons of baking soda and fill balloon. Pour ½ cup of vinegar into bottle. Fit the neck of the balloon over the neck of the bottle trying not to spill the soda into the bottle yet.

Tip the balloon full of baking soda into the bottle of vinegar and hang on to the neck of the balloon and the bottle. The balloon will fill up with carbon dioxide that is produced when an acid in neutralized by a base. This is exactly what happens in your bloodstream when you give sodium bicarbonate.

Concept: Carbon Dioxide enters the bloodstream and when mixed with water, becomes carbonic acid. This acid is relatively weak, like vinegar is. When a patient is hypercarbic (not blowing off enough ETC02) they develop respiratory acidosis. In the past, an acidotic state was treated with IV Sodium Bicarb. Giving sodium bicarb IV caused more side effects that benefits. When the sodium bicarb came in contact with the carbonic acid, it neutralized it, causing MORE carbon dioxide which mixed with the water in the bloodstream making MORE carbonic acid.

Strawberry Shortcake Experiment for MASH Camp

**Equipment:**

Serving bowls and spoons for the finished product

Two medium sized bowls for each group (3-4 kid per group)

1 cutting board and a knife for each group

1 medicine cup for each group

food service gloves for those who are prepping the food

one BIG bowl used to put all the strawberries into and serve for the whole class

paper towels

disinfectant wipes for surfaces

trash cans

**Groceries:**

Strawberries

Sugar

Shortcakes or shortbread, pound cake, biscuits with sugar coating, sugar cookies, etc

Ice cream or whipped topping

1. Divide the class into groups of 2-4 students. At least 2 students. Any more than four and someone doesn’t get to actively participate.
2. EVERYONE must wash their hands. This experiment involves food preparation and sanitation is important. Designate someone to wipe down the tables with disinfectant wipes prior to washing their hands.
3. Each group should have the following supplies at their station (this could be doled out earlier in baskets or bags and handed out or set aside at each table while the kids are washing their hands)
   1. 2 medium sized bowls for putting chopped strawberries
   2. one slightly larger than average spoon for mixing
   3. cutting board and knife
   4. medicine cup
   5. gloves for anyone touching the strawberries and sugar
   6. a serving bowl and spoon for each student
   7. a pen or marker and tape for labeling the bowls (unless they are Styrofoam and they can write directly on the bottom)
4. hand out the instructions and explain that in science and in healthcare, it is important to READ THE INSTRUCTIONS. Each person in the group should have a responsibility. Some people may have more than one task depending on the group size.
   1. cut/slice the strawberries
   2. making sure the instructions are followed.
   3. measuring the sugar and mixing the berries
   4. label the bowls.
5. Have someone pass around the container of sugar and allow each group to measure out about 15 mL of sugar per 1-2 cups of berries (not an exact science here, we just want enough sugar to sweeten half of the berries being chopped)
6. Once the strawberry prep has been done, set aside the bowls and use the powerpoint to explain how diabetics have trouble controlling their sugar. What happens when the sugar in their body becomes too low. What happens when sugar gets too high? Sugar is HYDROPHILIC which means “water loving” in latin. When a person’s blood sugar gets too high, water from their tissues will be drawn towards the high sugar levels. This extra water creates lots of urine. They pee a lot. This makes them dehydrated, so they drink a lot. The body STILL needs sugar INSIDE the cell to give it energy (the sugar is crowded OUTSIDE the cell waiting to get in) so they get hungry. All of this creates POLYDIPSIA, POLYPHAGIA, POLYUREA. Which in latin means, “lots of eating, lots of drinking and lots of urine <production>” This explanation should only take about 10 minutes. Enough time for the next step….
7. Have the students look at their strawberries. Without even looking at which bowl has sugar and which bowl doesn’t, it is easy to tell that one bowl has a lot more liquid and the other bowl has strawberries that look exactly like they did a few minutes earlier. Remember, sugar is HYDROPHILIC. The sugared bowl of strawberries are syrupy. Because the sugar pulled out juices from the strawberries. The “naked” strawberries aren’t juice at all. When a diabetic has a blood sugar higher than 200 (normal is 80-120) then fluids from the surrounding tissues gets pulled into the bloodstream to dilute down that sugar. Just like in the bowl of sugared strawberries.
8. Last step: have someone come around to each station and let the students pour their sugared strawberries AND un-sugared strawberries into the BIG bowl. Let them clean up their stations and pass out their serving bowls and spoons while another staff member passes out the ice cream or whipped cream and shortcakes to each kid. The person with the BIG bowl of strawberries will stir them all together when it is collected to distribute the sugared and non-sugared berries and go back to each station and serve the berries over the shortcake. Enjoy!

Surface Tension

2 glass microscope slides

Water

Drop one drop of water on the surface of one slide and place the other slide on the top. Notice that you can glide the slides back and forth over each other but it is hard to pull them apart? This is surface tension.

This is another example of how the lungs are able to expand and inflate during inhalation. We know that there is a thin layer of pleural fluid between the outside of the lung and the inside of the chest cavity. This thin layer of fluid creates a negative pressure that allows the lungs to expand. The “force” that keeps you from pulling the slides apart is surface tension. This is essential for newborns after the amniotic fluid leaves their lungs. This is why preemies need a medication called, surfactant if they are born too early. Surfactant acts like lubrication and helps the surface of the lungs adhere to the pleural membrane. This surface tension is what allows lungs to expand by gliding along the pleural membrane.

pH Weird Science Experiment

* Pipettes
* Litmus paper or electronic pH testers
* Small containers each numbered (baby food containers work great)
* Any or all of the following listed below

Aspirin, Antacids (the white ones), white vinegar, baking soda, Sodium Bicarb IV, Citric Acid (can be purchased from hobby stores, pool shock (powdered form), distilled water, small amount of water with several drops of a clear soap stirred in to it, diluted bleach, etc..

Now have the students figure out, with litmus paper or pH testers, the chemical’s pH and if it is an acid or a base. Encourage the students NOT to sniff or taste any of the chemicals. A snoot full of pool shock can damage mucous membranes!

Hints: Crush the solids into a powder so it isn’t recognizable by the students. Don’t forget to write down which chemical went in to which container so you will know the answers!

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\*For the Dry Ingredients: Place a small amount (equivalent to a pinch) of powder in a clean plastic specimen cup and add about 1 tsp of bottled water. Swirl to combine and at least partially dissolve.

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