**Five-Minute Labs**

**Magic Milk**

* Put 1-2 drops of food coloring above, below, right, and left of the center of a petri dish filled with milk (different types preferable)
* Dip a Q-tip in clear soap
* Add 2-3 drops of soap to the milk between the food coloring drops
* Record your observations
* Observe other groups’ experiment to see how their lab may differ
* Compare and contrast
* Observations
* Inquiry lab
* Isolating variables
* Determining rate
* Measurement
* Hydrophilic and hydrophobic
* Cell membrane proteins
* Fats and proteins
* Surface tension

**Melts in you mouth…**

* Put M&M or Skittles (one of each color) in the bottom of a petri dish with water
* Observe the change
* Observations
* Designing experiments
* Isolating variables

**Duck Dynasty**

* Cut the tip of a straw to a point
* Compress the pointed end with your lips and blow to make a whistle or duck-like sound
* Cut the end to change the pitch
* Add a bigger straw to make a “trombone”
* Harmonics
* Frequency/pitch
* Vocal cords

**A little about me…**

* 800 mL of water (distilled preferred), add 5 mL phenolphthalein in a frosted pitcher
* 4 cups
* Cup 1: nothing
* Cup 2: 5 drops 1 M NaOH
* Cup 3: 10 drops 1 M HCl
* Cup 4: 15 drops NaOH
* Pour “water” into cup 1 and 2
* Both go back into the pitcher
* Fill cups 1-3
* Back into the pitcher
* Fill all cups
* Acids and bases
* Indicators

**Immunology alternative**

* Put clear ammonia (1-2 mL) in one cup and add some water
* Let sit over night
* Put water in add the same amount of water to each cup
* Trade a pipette full with 3 people
* Add an indicator to see who is sick
* Spread(ing) of disease
* Disease origin
* STDs
* Water pollutants

**Green with envy**

* I cup water (distilled preferred)
* 1-2 drops NaOH
* 1-2 drops HCl
* ½ Alka-Seltzer
* 3 mL Bromothymol Blue
* Add bromothymol blue to water (should be green, add NaOH or HCl until it is)
* Add 1 drop HCl and observe
* Add 1-2 drops NaOH and observe
* Add ½ Alka-Seltzer
* Acids and bases
* Indicators
* Acidification of the oceans
* Oceans as a CO2 sink
* Hazards to calcium carbonate life forms (coral, snails, clams, etc) in the oceans
* Runaway greenhouse if the oceans turnover

**Green With Envy follow-up**

* Get 4 cups: (Make sure you have the same amount of water and buffer in each cup)
  + 2 with 10-20 mL water and Bromothymol Blue
  + 2 with 10-20 mL pH 7 buffer and Bromothymol Blue
* Repeat Green with Envy with the water cup
* Let the students make an hypothesis about the number of drops in each of the buffer solutions
* Repeat with buffer cups
  + Buffer in Your blood CO2 + H2O 🡨🡪H2CO3 + H2O🡨🡪HCO3- + H3O+
  + Buffering in lakes and aquifers (limestone acts as a natural buffer to acid rain over time)

**What do plants breath?**

* Put Bromothymol Blue solution in water, make sure the solution is basic (blue)
* Put half of the solution in another container
* Blow bubbles through a straw turning the solution acidic (yellow)
* Add basic solution to 3 test tubes and acidic solution to 3 test tubes
* Add Elodea to 4 of the test tubes, leaving one acid and one base test tube as the controls
* Cover one of the Elodea acid and one of the Elodea base test tubes with aluminum foil
* Put the test tubes in the window for 24 hours
* Record any changes
* Photosynthesis
* Respiration

**Lemon me guess**

* Select a lemon from the bag
* Take 3-5 minutes to describe your lemon on a post-it or sheet of paper
* Replace the lemon in the bag
* Pass your observations to your neighbor
* Locate your neighbor’s lemon based on the description
* Observations

**Inertia run**

* 120 inches (minimum! More works much better) of beaded chain in a cup
* Let it fall to the floor
* Inertia
* Gravity
* Speed/velocity

**Paper Drop Challenge**

Materials per group: 2 sheets of paper, stopwatch, 8 paperclips, 30cm of tape, scissors, meter stick.

* Have Materials Manager distribute supplies.
* You have 10 minutes for this activity.
* Make one whole piece of paper drop to the floor as fast as possible from a height of 2 meters and the other drop as slowly as possible from the same height. (Do not attach the scissors or meter stick to your paper.)

GO!

* As a group, describe your strategy for making the piece of paper:
* Drop the slowest
* Drop the fastest
* Make a table of your drop times for comparison with the class
* Explain why your two pieces of paper accelerate at different rates.
* Inquiry
* Free fall
* Air resistance
* Force diagrams

**What color is my stomach?**

* Add 3-4 mL of Universal Indicator
* Add 10 mL of vinegar to the bag
* Close the bag securely and shake well
* The solution should be orange/yellow
* Place 500 mL into the zip-top bag along with 10 mL Milk of Magnesia
* The solution should be a blue/purple color
* Add 10 mL of vinegar to the solution close and shake well
* Repeat step #7 until the solution is an orange/yellow color again
* Record how many mL it took to make the change

Note: You will need to shake the bag for a while to make sure that there will not be a delayed color change

* Digestion
* Acid/base
* Buffering

**Rates of reaction**

* 3 60 cc syringe w/ cap (go to your vet)
* 20 cc soda
* 3 cups
* Hot, cold, & room temp water
* Wait 5 min and see how much gas comes out
* Rates of reaction
* Gas laws
* Dissolved gasses in oceans or body systems

**Crayon Challenge**

* RoseArt & Cra-Z-Art Crayons float – more wax, less metals
* Crayola & Playskool sink – heavier metals used to make the colors
* Red and Yellow (Cadmium) work the best
* Go here for color info <http://www.dickblick.com/products/sennelier-dry-pigments/#photos> Select a color and you will find the chemical formula under the “pigment info” tab. Usually the more basic colors have simpler compounds.
* Density
* Chemical composition/compounds

**Can crusher**

* Add about 1-2 cm of water to an empty soda can
* Put on a hot plate (on high) until white steam comes out (more the better)
* Using beaker tongs, invert the can into a vat of room temperature water, making sure to seal the mouth of the can with the cool water
* Gas laws
* Atmospheric properties (weight of air/atmosphere)

**What’s that Gas**

* 2 clear containers with a birthday candle upright and lit
* Sprinkle baking soda in the bottom of one
* Sprinkle yeast in the bottom of the other
* Add vinegar to the container w/ the baking soda (avoid the lit candle)
* Add hydrogen peroxide to the bottom of the container with the yeast (avoid the candle)
* Observe what happens

2H2O2 🡪 2H2O + O2

* Properties of gases
* Gas identification
* Properties of matter
* Decomposition reaction
* Catalysis (yeast)
* Endothermic and exothermic reactions

**Raising gasses**

* Fish tank with 3 lot candles of different heights
* Baking soda sprinkled along the bottom
* Add vinegar (avoid the lit flame)
* Observe the candles
* Properties of gases
* Gas identification
* Properties of matter

**Elephant Toothpaste**

* Dissolve yeast into water
* Mix in liquid soap and food coloring
* Put 10 mL of mixture in a 100 mL graduated cylinder
* Add 15 mL of hydrogen peroxide
* Observe what happens

2H2O2 🡪 2H2O + O2

* Decomposition reaction
* Catalysis (yeast)
* Exothermic reaction
* Catalase enzyme

**Gravity Defying water**

* 2 Mason jars with rim – one with a mesh screen
* Fill with water and cover with an index card and invert, let the water fall
* Switch to the covered jar, repeat
* Surface tension
* Intermolecular forces
* Use of surface tension (water bugs etc)

**Fiery Volcano**

* Get a TOTALLY DRY 1, 2 or 3 L bottle
* Pour about 10 mL of 91% alcohol
* Cap the bottle
* Shake well and coat the sides of the bottle
* Open the lid and drop a burning match inside
* Chemical and physical changes
* Combustion reaction

**Magic powder**

* Sprinkle Non-dairy creamer (or corn starch or lycopodium powder) high over a candle
* Chemical and physical changes

**Totally dry**

* Put an object in the bottom of a beaker
* Add water to the beaker
* Sprinkle lycopodium powder on top
* Stick your finger in and get the object
* The powder will not let you break the surface tension
* Surface tension
* Intermolecular forces

**Flying column**

* 1 Lipton cold brew tea
* Cut off the staple area
* Empty the tea
* Open up and set up as a column with the opening top and bottom
* Light the top
* Convection

**Jumping flame**

* Blow out a candle that has been burning a little while
* Put a match in the smoke over the wick
* The flame should relight
* Properties of matter
* States of matter

**Same or not?**

* 4 transparencies
* Wrap in a cylinder shape hot dog style, tape
* Wrap in a cylinder shape hamburger style, tape
* Cut one hot dog style, tape, and wrap hot dog style
* Cut one hamburger style, tape, and wrap hamburger style
* Stack upright with the smallest on the inside and getting progressively larger
* Fill the inner most with dried beans
* Make you hypothesis
* Remove cylinders one by one
* Surface area vs volume
* Intestines
* Lungs

**To pop or not to pop**

* Dip a skewer into oil
* Blow-up a balloon
* Gently twisting at the top “belly-button” of the balloon, insert the skewer
* Push it out next to the knot (the reverse works as well)
* Alternative:
* Fill a zip-top bag ¾ of the way with water.
* Poke quickly through with a pencil or skewer
* Liquid friction
* Endocytosis and exocytosis

**Glowing Scorpions**

* Scorpions glow in UV light
* Specialized protein function
* Electromagnetic spectrum
* Visible vs nonvisible wavelengths

**UV beads**

* Have students identify what part of sunshine is causing the beads to change color (it is ok to put them in the microwave and UV flashlights are available at Home Depot and Lowes)
* Electromagnetic spectrum

**Reflected light**

* UV beads under different color thin fabric
* The beads under the fabric of the same color will not change
* Electromagnetic spectrum
* Visible vs nonvisible wavelengths

**I ate What?!?!**

* Crush Total cereal (the finer the better)
* Put it in a zip-lock bag
* Cover the cereal with water
* Run a strong magnet over the cereal slowly and look for little black particles casing the magnet – that is the iron in the Total
* Separating a mixture
* Properties of matter
* Types of matter

**Simple motor**

* Put a rare earth magnet (neodymium magnet) on the head of a nail
* Put the nail on the bottom of a battery
* Using a thick copper wire, put one end on the top of the battery and touch the other end gently to the magnet until you get it to start spinning
* Magnetism
* Charged particle in a magnetic field
* Simple machines

**Simply Sweet**

* Find a way to dissolve a sugar cube in water, BUT you may only change one variable in your experiment.
* Isolating variables

**Are you mass enough?**

* Use large steel marbles to illustrate how you can convert kinetic energy to thermal energy by hitting them together with paper between them
* F=ma
* KE=1/2mv2
* Conservation of energy
* Kinetic energy 🡪 thermal energy (friction)

**Chain reaction**

* Use popsicle sticks interlocked in a woven patter to illustrate kinetic and potential energy
* Conservation of energy
* Potential energy 🡪 Kinetic energy

**How much is enough?**

* Find out how much water is necessary to prevent 100% acetone from eating through cheap plastics or Styrofoam
* Inquiry
* Concentration
* Percentage
* Impact on changing percentages to various systems and reactions

**Clean your money**

* Get 2 corroded pennies per group
* Add soap to the top of one penny
* Add hot sauce or salsa (I like the packets since they have the ingredients on them)
* Wait 5-10 min
* Clean off the pennies and see which was cleaned by the solutions
* Acid/base properties

**Balloon challenge**

* Find a way to blow up a balloon without the use of a pump and without using your mouth
* A “blown up” balloon is, by definition, at least 20 cm in circumference
* Physical vs chemical change
* Gas laws
* Inquiry

**Bleeding Paper**

* Get a sheet Golden Rod paper\*
* Dip hand in ammonia
* Slap paper with wet hand
* Use vinegar to reverse the color change

\*See the file in the LiveBinder on how to make the paper

* Acid/bases properties
* Indicators

**MELLOW YELLOW**

* Dilute mustard in water
* Add ammonia
* Use vinegar to reverse the color change
* Acid/bases properties
* Indicators

**Marshmallow in a syringe**

* Put the marshmallow in the syringe
* Make sure the plunger of the syringe is at the top (away from the end that liquid comes out of)
* Cover the end of the syringe with your thumb while holding the syringe
* Push the plunger of the syringe
* Release the pressure
* Make sure the plunger of the syringe is at the top of the marshmallow without compressing the marshmallow
* Cover the end of the syringe with the cap while holding the syringe
* Pull the plunger of the syringe
* Gas laws
* Bends
* Effects on the human body during flight/space flight
* Effects on the human body during scuba diving or deep sea missions

**Too Hot to handle**

* Make sure the aquarium thermometer is attached to bottom of the Fizz-Keeper and that the Fizz-Keeper is tightly screwed down in the top of the 1-L bottle
* Record the temperature
* Push the Fizz-Keeper 10 times
* Record the temperature
* Repeat steps #3-4 until you max out the thermometer
  + Gas laws
  + Properties of the atmosphere

**Straw Popper**

* Hold both ends of the straw with your thumb and forefinger
* Raise one hand vertically over the other
* Wrap the ends of the straw around itself by winding your hands hand-over-hand, until the straw it taught near the center of the straw
* Have your partner quickly flick the taught straw; this should make a sound, if not, try again.
* Gas laws

**Hot Air Balloon**

* Turn the heat gun on and aim it towards a collapsed area of the balloon. Note: do not get any closer than 6-12 inches from the balloon or you could melt the balloon!
* Continue to heat the balloon, moving the heat gun constantly, until the balloon begins to rise
* Gas laws
* Convection

**Nimble Nickel**

* Remove one of the bottles from the cooler
* Dampen your finger in the beaker of water
* Run your damp finger over the mouth of the bottle to dampen it
* Place the nickel on the top of the bottle (make sure the mouth of the bottle is totally covered)
* Rub your hands together well to get them nice and warm (friction)
* Without disturbing the nickel, hold the bottle in both hands and observe what happens to the nickel
* Gas laws
* Convection

**Magical Syringe**

* Place pull the plunger all the way up on the small syringe and place the plug on the end
* Put the plugged syringe inside of the 1-L soda bottle
* Attach the Fizz-Keeper to the top of the bottle and verify that the Fizz-Keeper is tightly screwed down in the top of the 1-L bottle
* Record the volume reading on the small syringe
* Push the Fizz-Keeper 10 times
* Record the volume reading on the small syringe
* Repeat steps #5-6 until you have reach 50 pumps
* Carefully release the pressure on the bottle
* Gas laws
* Bends
* Effects on the human body during flight/space flight
* Effects on the human body during scuba diving or deep sea missions

**Alka-Seltzer Rainbow**

* Measure out approximately 1050 mL of distilled water.
* Add 300 mL of 0.1 M NaOH.
* Add 30 mL of universal indicator and stir. The solution should be dark purple.
* Pour the solution into the 2000 mL graduated cylinder.
* Drop 3 Alka-Seltzer tablets into the graduated cylinder. Observe the color changes as the carbon dioxide bubbles are formed.
* When the tablet rises to the top of the graduated cylinder or when yellow starts appearing, add about 30 mL of vinegar to the solution. This will turn the solution in the top of the graduated cylinder red.
* Acids and bases
* Indicators
* Dissolved gasses

**Vacuum Pack Students**

* Place a person in the bag.
* Place the suction end of a vacuum hose in the bag and have the person loosely cup his/her hand around the end to prevent clothing or the plastic bag from being caught in the hose.
* Gather the loose ends of the open bag around the neck of the person, paying attention to sealing off around the hose as well.
* Turn on the vacuum.
* Shut off the vacuum at the first sign of discomfort!
* Atmospheric properties (weight of air/atmosphere)

**Nebula Paper**

* Make a shaving cream pie the size of your index card
* Add 5-10 food coloring
* Swirl with a skewer
* Press the card into the foam
* Scrape off the foam
* Hydrophilic and hydrophobic
* Cell membrane proteins
* Polar and nonpolar bonds

**Whoop Tube**

* Put 10 drops of hydrochloric acid into a clean test tube.
* Cut a 1 cm magnesium strip then add it to the hydrochloric acid by gently sliding it down the side of the test tube.
* Invert a clean, dry test tube, labeled “catch,” over the reaction test tube to capture any gas produced.
* Collect the gas for one to two minutes.
* Light the wood splint on the tea candle.
* Insert the flaming splint into the inverted, or catch, test tube and observe what happens.

*Note: this might startle you*

* Touch the outside of the test tube and observe any temperature changes.
* If nothing happens, try again, including in the bottom tube.
* Signs of a chemical change
* Change in energy

**Flaming Ramp**

* Place the ramp on the test tube at approx. 20o
* Place an unlit candle on the countertop directly below the lower end of the ramp
* Pour about 2–3 mL of hexane into the 1-L Erlenmeyer flask.
* Place a stopper on top of the flask and swirl the flask
* Allow the flask to sit for a few minutes to allow hexanes vapors to fill the flask.
* Light the candle and position it so that the flame is even with the bottom of the vapor ramp.
* Remove the stopper from the flask containing the hexanes. Gradually pour the hexane vapors down the ramp for about three seconds.
* Properties of a gas
* Combustion

**Egg-splosion**

* Blow out the contents of an egg
* Rinse out the inside several times with water, and allow the egg to dry overnight
* Cover the top hole of the egg with a piece of tape or putty.
* Introduce hydrogen gas slowly through the bottom hole using a thin delivery tube that extends upward to the top of the egg
* Charge the egg for 30–40 seconds to flush out the air.
* Place the egg on the egg stand in an upright position with the taped hole on top behind a safety shield
* Remove the tape and hold a lit butane safety lighter briefly to the top hole.
* It will take a couple of seconds for a response
* Signs of a chemical change
* Synthesis reaction
* Compounds form in a specific ratio

**Burning without a flame**

* Mix 30 mL of hydrogen peroxide and 1 scoop of yeast in the gas production bag
* Press out most of the air from the bag and seal it. Put the nail in the stopper
* Shake the bag to mix the contents and set it aside
* Break off a small piece of candle wax and place it in a small test tube and set aside
* Remove the nail from the stopper and draw out a full pipette of oxygen from the bag. Reseal the bag then set aside the pipette
* Light the Bunsen burner
* Using a test tube clamp, hold the test tube at a slant over the flame until the wax melts and then boils.
* Remove the test tube from the flame
* Insert the stem of the stem of the pipet into the test tube about halfway and bend the stem so the bulb is below the mouth of the test tube

*Caution*: Keep holding the pipet bulb away from the mouth of the test tube

* Give the bulb a quick squeeze.
* Effects of concentration (when is enough enough, or too much)
* Kinetics

**FIVE FINGER FICUS**

* Dip a cotton ball in water and squeeze out the excess water
* Put 2-5 seeds, depending on the size, on the cotton ball
* Push the cotton ball down into the finger of a clear glove
* Repeat the process until all of the fingers and thumb of the glove are seeded
* Monitor the growth of the seeds for 1 week before planting the seedlings
* Inquiry
* Early plant development

**BLOOD IS THICKER THAN….**

* Add hydrated red water beads, 1 cm x 2 cm piece of red foam, ping pong balls and some excess water to a container (exact amounts will vary based on the size of the container)
* Vary amounts of each based on the condition you want to discuss
* Properties of blood
* Disease

**LETS GET BUGGIE**

* Get a bug, a bead and a cube
* Take any measurement and observations you are interested in collecting
* Put the bug, bead, and cube into about 200 mL of water
* Record your measurements every 30 min to 1 hour
* Continue the experiment 1-4 days
* Analyze and graph the results for best outcome
* Measurement
* Density
* Graph identification (linear, exponential, logarithmic)

**IODINE CLOCK**

* Grind up a 1000 mg Vitamin C tablet
* Dissolve tablet into 60 mL water (30 mL water if you use a 500 mg tablet)
* Add 5 mL of the Vitamin C mixture to 60 mL water (save the rest for another experiment/trial), and 5 mL of 2% iodine in a cup
* In another cup, combine 15 mL 2% hydrogen peroxide and 2.5 mL liquid starch
* Combine the two cups and stir
* Wait!
* Vary the amounts of the ingredients to see what roll each plays in the reaction and how the varying amount impacts the rate of reaction
* Rate of reaction
* Kinetics
* Catalyst
* Inhibitor
* Concentration
* Chemical reactions