

INSTRUCTIONS & TIPS

BEFORE YOU BEGIN ANY OF YOUR EXPERIMENTS...

- MAKE SURE TO READ ALL INSTRUCTIONS CAREFULLY.
- ADULT SUPERVISION IS RECOMMENDED FOR THIS ACTIVITY.
- KEEP SMALL CHILDREN AWAY FROM THE CHEMICALS USED IN THIS ACTIVITY.
- THESE CHEMICALS CAN CAUSE EYE AND SKIN IRRITATION. KEEP ALL CHEMICALS AWAY FROM YOUR EYES, DO NOT SWALLOW ANY CHEMICALS AND BE SURE TO WASH YOUR HANDS WITH SOAP AND WATER WHEN YOU ARE FINISHED. ALSO, MAKE SURE NOT TO TOUCH ANY PART OF YOUR FACE DURING THIS ACTIVITY.
- ADDITIONAL BAKING SODA MAY BE REQUIRED TO COMPLETE SOME OF THE EXPERIMENTS.

⚠ WARNING: THIS SET CONTAINS CHEMICALS THAT MAY BE HARMFUL IF MISUSED. READ CAUTIONS ON INDIVIDUALLY CONTAINERS CAREFULLY. NOT TO BE USED BY CHILDREN EXCEPT UNDER ADULT SUPERVISION.

CONTENTS:

SODIUM TETRABORATE



ZINC SULFIDE



LITMUS POWDER



SODIUM ALGINATE



MEASURING CUP



2 TEST TUBES



TARTIC ACID



CALCIUM CHLORIDE



BAKING SODA



PIPETT



BLACKLIGHT PEN



WHITE GLUE



PLASTIC SPOON



2 MIXING STICKS



YELLOW FUZZY STICK



1. Bubbling Experiment

SUPPLIES:

- Baking Soda
- Vinegar (Not Included)
- Pipette
- Test Tube
- Spoon

INSTRUCTIONS:

- Pour 1 spoonful of baking soda into a test tube.
- Fill a pipette with vinegar and slowly drop it into the test tube. Watch the reaction occur.
- The combination of the vinegar and baking soda creates carbon dioxide gas.

2. Super Bubbling Reaction

SUPPLIES:

- Baking Soda
- Vinegar (Not Included)
- Dish Soap (Not Included)
- Pipette
- Test Tube
- Spoon
- Beaker

INSTRUCTIONS:

- Follow the instructions from Experiment #1, but add a drop of dish soap to the vinegar, then add it to the baking soda. This will create a much more bubbly reaction!

3. Foam It Up!

SUPPLIES:

- Baking Soda
- Tartaric Acid
- Test Tube
- Water (Not Included)
- Match (Not Included)

INSTRUCTIONS:

- In a clean, dry test tube, mix 1 spoonful of baking soda and 1 spoonful of Tartaric acid.
- Add 2ml of water to the test tube and watch as the reaction foams!

4. The Eternal Flame

SUPPLIES:

- Test Tube
- Baking Soda
- Tartaric Acid
- Spoon

INSTRUCTIONS:

- Ask an adult to help with this experiment.
- In a clean, dry test tube mix 1 spoonful of baking soda with 1 spoonful of tartaric acid.
- Ask a parent or guardian to light a match, quickly remove the paper and insert the burning match into the test tube. Does it keep burning?
- The weight of the carbon dioxide will extinguish the fire. Today most fire extinguishers contain carbon dioxide gas (CO₂).

5. The Disappearing Flame

SUPPLIES:

- Baking Soda
- Tartaric Acid
- Paper (Not Included)
- Test Tube
- Pen (Not Included)
- Water (Not Included)
- Match (Not Included)
- Pipette

INSTRUCTIONS:

- Ask an adult to help with this experiment.
- In a clean, dry test tube mix 1 spoonful of baking soda with 1 spoonful of tartaric acid.
- Cut a 2 inch (4.9 cm.) paper circle and punch a hole into the center with a pen. Place the paper over the test tube with the hole in the center the opening of the tube. Fold the edges of the paper down and hold tight so little air can escape.
- Fill a pipette with water. Place the tip on the center of the paper, slowly dripping the water into the test tube.
- Wait a few seconds for the foam to subside, then remove the pipette.
- Ask a parent or guardian to light a match, quickly remove the paper and insert the burning match into the test tube. Does it keep burning?
- The fire should go out.

6. Put Out That Fire!

SUPPLIES:

- Tea Candle (Not Included)
- Test Tube
- White Vinegar (Not Included)
- Baking Soda
- Match (Not Included)
- Spoon

INSTRUCTIONS:

- Ask an adult to help with this experiment.
- Place a tea candle on a fireproof surface. Ask a parent or guardian to light the candle.
- Fill a test tube halfway with white vinegar.
- Add a spoonful of baking soda to the test tube. Be sure it to hold the tube upright as the foam forms.
- Once the bubbling subsides ask an adult to carefully tilt the test tube toward the open flame and carefully pour out the air over the flame, without pouring out any liquid. Watch the flame magically go out, due to the carbon dioxide (CO₂)!

7. Litmus Experiment #1

SUPPLIES:

- Litmus Powder
- Test Tube
- Water (Not Included)
- Pipette
- Spoon

INSTRUCTIONS:

- Pour less than half a spoonful of litmus powder into a test tube.
- Add enough water so the test tube is filled half way. Put on the cap and shake it up.
- Set aside for 1 day so the litmus solution can form. Store the solution keep it in a dark place to preserve the shelf life.

8. Litmus Experiment #2

SUPPLIES:

- 2 Test Tubes
- Water (Not Included)
- Litmus Solution from Litmus Experiment #1
- Beaker
- Pipette
- Vinegar (Not Included)

INSTRUCTIONS:

- Fill a test tube $\frac{3}{4}$ of the way with water. Use a pipette to add 7 drops of litmus solution. Close the test tube and shake.
- Pour $\frac{1}{3}$ of the solution into the second test tube and pour another $\frac{1}{3}$ into the beaker.
- With a clean pipette, add 1 drop of vinegar to the first test tube and shake it a little.
- What do you see? It should turn red! The color red shows that the item you have tested is an acid.

9. Litmus Experiment #3

SUPPLIES:

- Test Tube of Litmus Solution from Litmus Experiment #2
- Tartaric Acid
- Spoon

INSTRUCTIONS:

- Use the end of the handle of the spoon to measure out a little tartaric acid and add it to the test tube with the litmus solution.
- Is there a color change? It should turn red! The reason behind this color change is the tartaric acid and it is exactly that; an acid.

10. Litmus Experiment #4

SUPPLIES:

- Beaker of Litmus Solution from Litmus Experiment #2
- Pipette
- Orange Juice (Not Included)

INSTRUCTIONS:

- Add a few drops of orange juice to the beaker with the litmus solution.
- Does it change colors? It should turn a light red because it's acidic!

11. Litmus Experiment #5

SUPPLIES:

- Final Red Litmus Solution from Litmus Experiment #4
- Baking Soda
- Vinegar (Not Included)
- Pipette
- Spoon

INSTRUCTIONS:

- Take the litmus solution from litmus Experiment #4 that turned red. Use the end of the handle of the spoon to add a little baking soda to this solution.
- What happens? The fizzing in the solution will start to turn blue! If you don't see this, you may need to add more baking soda. Adding a base (alkaline) makes the blue color becomes more dominant.
- Add a few drops of vinegar using the pipette. What do you see now? It turns back to red!

12. Litmus Experiment #6

SUPPLIES:

- Tartaric Acid
- Test Tube
- Blue Litmus Solution from Litmus Experiment #6
- Water (Not Included)
- 2 Clean Test Tubes

- Spoon

INSTRUCTIONS:

- Using the end of the handle of the spoon to add some tartaric acid to a test tube.
- Fill the second test tube half way with water. Add a few drops of the blue litmus solution, cover and shake.
- Pour the blue solution into the tartaric acid and the solution will turn red again!

13. Litmus Experiment #7

SUPPLIES:

- Litmus Solution from Litmus Experiment #1
- Water
- 2 Clean Test Tubes
- Baking Soda
- Tartaric Acid
- Pipette
- Spoon

INSTRUCTIONS:

- Fill a test tube $\frac{1}{2}$ way with water and add 5 drops of the litmus solution to it.
- Place $\frac{1}{2}$ a spoonful of baking soda into the second test tube and add a pinch ($\frac{1}{8}$ teaspoon) of tartaric acid. Mix well.
- Add 1 pipette full of water to the second test tube and quickly cover it.
- Shake it slightly, then take off the cover and quickly cover it again with your thumb.
- While using your thumb to trap the air in, pour out the liquid. Once the liquid has been removed, pour the litmus solution into the second test tube. The air will make the litmus solution turn red!

14. Test Your Foods

SUPPLIES:

- Litmus Solution from Litmus Experiment #1
- Red Cabbage (Not Included)
- Lemon (Not Included)
- Spinach (Not Included)
- Apple (Not Included)
- Kale (Not Included)
- Tomato (Not Included)
- Distilled Water (Not Included)
- 5 Cups (Not Included)
- Pipette

INSTRUCTIONS:

- Ask an adult to help with this experiment.
- Cut up the fruits and vegetables you are using for this experiment.
- Place the kale, cabbage, apple, and spinach into separate cups.
- Add 30 mL of water to each cup. Muddle the vegetables to juice them.
- Remove the vegetables and fruit from the liquid.
- Squeeze the tomato juice and lemon juice into separate cups.
- Use a pipette to drop some of the litmus solution into the fruit and vegetable solutions. What color do they change into?

15. Make Your Own Worms!

SUPPLIES:

- Sodium Alginate
- Water
- Calcium Chloride
- Pipette
- Beaker
- Cup (Not Included)
- Spoon

INSTRUCTIONS:

- Mix 1 bag of sodium alginate with 1 cup of water.

- In your beaker and ½ pack of calcium chloride in the cup with water and stir.
- Use the pipette to draw up the sodium alginate mixture, then slowly and steadily drop a stream of the sodium alginate into the calcium chloride mixture.
- Swirl the calcium chloride solution with a spoon. Pull out the slimy strands that look like worms!

NOTE: Sodium alginate and worm experiment must be disposed in garbage. Do not pour down the sink.

16. Water, Water, Everywhere! Tap water, tonic water, flat tonic water

SUPPLIES:

- Baking Soda
- Tap Water (Not Included)
- Tonic Water (Not Included)
- Flat Mineral Water (Not Included)
- Bottled Water (Not Included)
- Litmus Solution from Experiment #7
- Pipette
- 2 Test Tubes
- Spoon

INSTRUCTIONS:

- Add 1 spoonful of baking soda to a test tube and fill it half way with tap water. Put the cap on and swirl it to dissolve the baking soda.
- Take the second test tube and fill it half way with tonic water. Add 5 drops of the litmus solution. Does the color change?
- Use the pipette to add a few drops of the baking soda solution into the second test tube and swirl. What do you see?
- Keep adding drops of the solution until the blue stays for 5-10 seconds.

17. Water, Water, Everywhere! Tap water, tonic water, flat tonic water

INSTRUCTIONS:

- Complete the steps from Experiment #16, but instead of tonic water, use flat mineral water and see how your results vary!

18. Water, Water, Everywhere! Tap water, tonic water, flat tonic water

INSTRUCTIONS:

- Complete the steps from Experiment #16, but instead of tonic water, use bottle water and see how your results vary! The tonic water will turn red/pink due to the process of the water being carbonated.

19. Create Your Own Sodium Acetate!

SUPPLIES:

- Vinegar (Not Included)
- Pot (Not Included)
- Baking Soda

IMPORTANT:

Adult supervision required. Perform in a well-ventilated kitchen.

INSTRUCTIONS:

- Add 4 cups of vinegar into a pot. As it boils slowly add baking soda, one tablespoon at a time.
- Add 4 tablespoons in total. It will fizz a LOT, so be CAREFUL as the liquid will be very hot.

- Allow the solution to boil down, mixing until all of the baking soda is dissolved and the solution stops fizzing.
- You have just created sodium acetate!

20. Creating Concentrated, Solid Sodium Acetate!

SUPPLIES:

- Solution from Experiment #19
- Pot (Not Included)
- Heat Safe Glass Container (Not Included)

IMPORTANT:

Adult supervision required.

INSTRUCTIONS:

- Boil solution from Experiment #19 until 75% of solution has dissolved (about 1 cup of liquid is left in your pot). This could take 30-60 min.
- White powder crystals will start to form around the top edge.
- If it turns brown or yellow, you are boiling it at too high of a temperature.
- Once boiled down, pour the concentrated liquid into a heat safe glass container. DO NOT TO SHAKE THE SOLUTION.
- Place aside side to cool. You can place in the fridge.
- Once cooled, you will have concentrated, solid sodium acetate!

21. Hot Ice

SUPPLIES:

- Concentrated/Solid Sodium Acetate Solution from Experiment #20
- Glass Plate (Not Included)
- Mixing Stick

INSTRUCTIONS:

- Use the mixing stick to scrape a little of the solid sodium acetate from your pot, approximately 1 teaspoon, and place it in the center of a glass plate. This is the seed for the crystal to form on.
- Carefully take the cooled sodium acetate solution from Experiment #20 and pour it slowly onto the crystal seed. The hot ice will start to form. The slower you pour, the higher the crystal will go.

22. Hot Ice II – Sodium Acetate Crystal

SUPPLIES:

- Mixing Stick
- Solid Sodium Acetate From Experiment #20

INSTRUCTIONS:

- Use the mixing stick to scrape approximately 1 teaspoon of the solid sodium acetate and slowly place it into the center of the cooled, concentrated sodium acetate solution and hold.
- It will crystalize your entire solution!

23. SLIMYGLOOP™ Brand Creations

SUPPLIES:

- Sodium Tetraborate
- Water (Not Included)
- Cup (Not Included)
- Glue

INSTRUCTIONS:

- Add half a spoonful of sodium tetraborate to 15ml of warm water. Stir well.
- Squeeze the glue tube into the solution and stir. Now you have SLIMYGLOOP™!
- **Fun Tip:** Add food coloring to create colorful SLIMYGLOOP™.

24. Glowing Ectoplasms

SUPPLIES:

- Sodium Tetraborate
- Water (Not Included)
- Cups (Not Included)
- Glue
- Zinc Sulfide

INSTRUCTIONS:

- Add half a spoonful of sodium tetraborate to 15ml of warm water. Stir well.
- Squeeze the glue and half of the zinc sulfide into the solution and stir.
- Slowly pour the contents from the second cup into the first cup while stirring. Now you have glowing SLIMYGLOOP™!
- To maximize the glow, let your SLIMYGLOOP™ sit in direct light for 2-4 hours before testing it in the dark.

25. Tartaric Acid Solution

SUPPLIES:

- Test Tube
- Tartaric Acid
- Water (Not Included)

INSTRUCTIONS:

- Dissolve 1 spoonful of tartaric acid in ½ a test tube of water. This is a tartaric acid solution.

26. Foam Test

SUPPLIES:

- Test Tube
- Liquid Soap (Not Included)
- Water (Not Included)
- Tartaric Acid Solution from Experiment #25
- Pipette

INSTRUCTIONS:

- Add two drops of liquid soap into a test tube and fill it with water. Cover the test tube and shake.
- Use the pipette to add a few drops of tartaric acid solution from Experiment #25.
- What happens: Foam doesn't disappear.

27. Collapsing Foam

SUPPLIES:

- Tartaric Acid Solution from Experiment #25
- Soap Shavings (Not Included)
- Test Tube
- Distilled Water (Not Included)
- Pipette

INSTRUCTIONS:

- Add 5 soap shavings to a test tube.
- Fill it with distilled water and shake well until foam appears.
- Use the pipette to add a few drops of the tartaric acid solution from Experiment #25 to the soap and water solution.
- The foam will collapse!

28. Create Your Own Glow Stick!

SUPPLIES:

- Zinc Sulfide
- Clean Test Tube
- Water (Not Included)
- Oil (Vegetable or Mineral) (Not Included)

INSTRUCTIONS:

- Add a small amount of zinc sulfide, to a test tube and fill it half way with water. Use the end of the spoon handle to measure.
- Fill the other half with oil (vegetable or mineral). Cover and shake.
- Let it charge in light for about a minute, shake it and watch it glow!
- Try shining the black light on it and observe what happens.

29. Sodium Tetraborate Crystal

SUPPLIES:

- Plastic Beaker
- Hot Water (Not Included)
- Sodium Tetraborate
- Fuzzy Stick
- Mixing Stick

INSTRUCTIONS:

- Ask an adult for help with this experiment.
- Fill the beaker with hot water and stir in all but one spoonful of sodium tetraborate. Stir until dissolved.
- Wrap one end of a fuzzy stick around the mixing stick.
- Bend the fuzzy stick into a desired shape or ball.
- Dip the fuzzy stick into the sodium tetraborate solution. Let sit overnight.
- The next day crystals will start to form!
- Let the solution sit for a few days to create a larger crystal.

30. Ice Melting

SUPPLIES:

- Ice (Not Included)
- Calcium Chloride

INSTRUCTIONS:

- Sprinkle a quarter of the bag of calcium chloride onto an ice cube and see what happens. It melts!

31. Feel the Cold

SUPPLIES:

- Baking Soda
- Vinegar (Not Included)
- Resealable Plastic Bag (Not Included)
- Spoon

INSTRUCTIONS:

- Add 2 spoonful's of baking soda and 4 spoonful's of vinegar into resealable plastic bag.
- Feel the outside of the bag and notice what is happening. It gets cold!

32. Feel the Warmth

SUPPLIES:

- Baking Soda
- Calcium Chloride
- Water (Not Included)
- Resealable Plastic Bag (Not Included)

INSTRUCTIONS:

- Add 2 tablespoons of baking soda and a ¼ of the bag of calcium chloride to half a cup of water inside a resalable plastic bag.
- Feel the outside of the bag and notice what is happening. It gets warm!

33. Tartaric Acid Crystal

SUPPLIES:

- Tartaric Acid
- Water (Not Included)
- Cup (Not Included)

INSTRUCTIONS:

- Mix 1 spoonful of tartaric acid and half a cup of warm water in a disposable paper cup. Let it evaporate and over time crystals will form.
- Check on it every day to monitor progress.
- What type of crystals are forming? Do the crystals have a specific shape?
- Try this experiment in a different sized container; have the crystal shapes changed?

34. Glow Cup

SUPPLIES:

- Tonic Water (Not Included)
- Zinc Sulfide
- Black Light Pen
- Spoon
- Beaker

INSTRUCTIONS:

- Add a pinch of zinc sulfide to a cup of tonic water.
- Mix well and take it into a dark room.
- Shine the black light on the mixture and watch it glow!
- Quinine reacts to the ultraviolet light. The quinine absorbs light energy, which excites their atoms and releases the energy as light.

35. Freeze it up!

SUPPLIES:

- Tonic Water (Not Included)
- Ice Cubes (Not Included)
- Beaker
- Black Light

INSTRUCTIONS:

- Freeze tonic water in an ice cube tray.
- Put the frozen cubes in a regular glass and shine the black light on it.
- As it melts the water will also start to glow!

36. It's Egg Time!

SUPPLIES:

- Eggs (Not Included)
- Pan or Pot (Not Included)
- Black Light Pen

INSTRUCTIONS:

- Ask an adult to help with this experiment.
- Fry an egg and hold the black light over it.
- What happens? It glows blue.
- Now try boiling an egg and holding the black light over it.
- What color is it now? It has a yellow tint.
- Try holding the black light over shelled eggs.
- What color is it now? It's pink to dark red.

37. Detecting Chlorophyll

SUPPLIES:

- Chopped Lettuce (Not Included)
- Black Light Pen

INSTRUCTIONS:

- Hold freshly chopped lettuce under the black light.
- What happens? It glows a pinkish-red. The black light highlights the chlorophyll that is being released, but as the chlorophyll dissipates it will no longer glow.
- Try this with sliced peppers.

38. Is Your Banana Ripe?

SUPPLIES:

- Banana (Not Included)
- Black Light Pen

INSTRUCTIONS:

- Start with an un-ripened banana and shine the black light on it. Nothing will glow.
- Test the banana with the black light every day to determine when the banana becomes ripe.
- Ripe bananas glow blue. It is connected to degradation of chlorophyll during the ripening. This breakdown is colorless to us, but under a black light you can see the phosphorescence that is being released.

39. Highlight it Up!

SUPPLIES:

- Black Light Pen
- Highlighters (Yellow and Colored) (Not Included)
- Yellow Marker (Not Included)
- Paper (Not Included)

INSTRUCTIONS:

- On a blank piece of paper draw a box and color it in with the black light pen.
- Next to the first box, do the same thing with a yellow highlighter.
- Next to the yellow highlighter box, repeat with a regular yellow marker.
- See which colors glow best with the black light.
- Take the paper outside and see which box glows best. This is called phosphorescence. The ink absorbs sunlight.

40. Humidity Test

SUPPLIES:

- Calcium Chloride
- Bowl (Not Included)

INSTRUCTIONS:

- Take a few pieces of the calcium chloride and set it aside in a bowl overnight.
- When you take a look in the morning, what do you see?
- It has turned into liquid brine. Calcium chloride is hygroscopic; it attracts moisture from the surrounding air.
- Leave it out for a couple more days and check on it daily. It should solidify again.
- The lack of moisture causes it to release heat and crystalize again.

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