HOME SCIENCE LABS!

Science Experiments for all ages!

www.BealsScience.com/Home-Science-Labs

Science is about discovering new things through experimentation. But science doesn't have to only be done in a lab or at school. You can do science at home, in your back yard or even in your kitchen! All you have to do is be curious, be willing to try new things, and be willing to learn by experimenting.
~Have fun and Keep on Learning!

List of Labs/Activities

1. Butterfly Pea Tea - pH Indicator
2. Disappearing Water
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4. Bread Clip Catapult
5. Giant Bubbles
6. Screaming Balloon

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He also has a YouTube channel and Website to help encourage people to have fun learning science!

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Butterfly Pea Tea - pH Indicator

Introduction

Have you ever eaten something that is really sour like a lemon or sour gummy worm? What did it feel like when you ate it? The sour flavor comes from acids in the candy or food. There are some pigments (colors) that actually change color when they become more or less acidic. So, let's see if we can make a beautiful cup of blue tea change color when we add lemon juice which is very sour because it is very acidic.

Equipment

- Butterfly Pea Flowers
- Water
- Beaker or Coffee Cup
- Microwave or Stovetop
- Pipette
- Crystal Light (pH 2.77)

Directions:

1. Brew the butterfly pea tea by putting the flower petals into 200 ml boiling water.
2. Let the tea steep for a minimum of 5 minutes (or until the water changes into a bright blue color) then remove the flowers.
3. Make the crystal light according to the instructions on the packet.
4. Taste the tea and taste the crystal light. **What differences do you notice?**
5. Once cooled, add 100 ml of tea to the glass beaker.
6. Using a pipette, drip the crystal light lemonade that you made in the earlier step, into the tea, counting the drops, until you see a noticeable change in color. **Record the number of drops.**
7. Taste the mixture. **How does it taste?**
8. Repeat the experiment but drip the tea into the crystal light.
9. Experiment with other drinks by dripping them into the butterfly pea tea to see how they change color.
    - I suggest making a basic solution by mixing baking soda (Sodium bicarbonate) with water in different ratios to see what happens!

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Questions:

1. Is the crystal light acidic or basic?
2. Why does butterfly pea tea change color when the pH changes?
    - (Hint: Explanation of Acid/Base and why indicator changes color - pH Indicator from Red Cabbage: https://youtu.be/hPcRylO4lQM)

Resources:

- Beals Science Video: Explanation of Acid/Base and why indicator changes color - pH Indicator from Red Cabbage: https://youtu.be/hPcRylO4lQM
- Butterfly Pea as a pH Indicator (includes colors and pH diagram): http://isjos.org/ISJOSv11p2-ButterflyPeaIndicator.pdf
- Application of Butterfly Pea Extract as an indicator of acid-base titration: https://www.researchgate.net/publication/322355749_Application_of_Butterfly_Pea_Extract_Clitoria_ternatea_Linn_as_An_Indicator_of_Acid-Base_Titration
- pH of Beverages in the US: https://www.ada.org/en/~/media/ADA/Public%20Programs/Files/JADA_The%20pH%20of%20beverages%20in%20the%20United%20States

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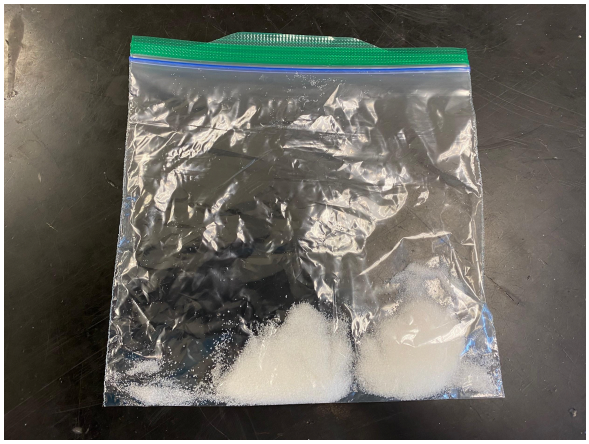
Disappearing Water Trick

Introduction
Science is magic! And, magic is science! Every magic trick can be explained by science. In this experiment you get to learn how to do a magic trick and the science behind how it works!

Equipment:

- 1 1/2 teaspoons Sodium Polyacrylate (approx. 7 grams)
- 1/2 Cup water (100ml)
- 3 plastic cups



Directions:

1. Find three plastic cups that are not transparent.
2. Put the sodium polyacrylate in the bottom of one of the cups.
3. Find a willing subject to perform some magic on (this might be over a video chat or in person with someone you live with).
4. Explain to the person that you are going to play a game where you will pour water into a cup, move the cups around very quickly, and they must keep track of the cup with the water. Then, they will tell you which cup they think has the water. Turn the cup upside down (no water comes out). Do the same with the other cups (no water comes out). Bow - you are now a magician.
5. **Explain why the 'trick' works to the poor person you just tricked - explain the science! (see "Resources" below)**

Resources

- How does the disappearing Water Trick work? https://www.bealsscience.com/post/2016/07/19/disappearing-water-trick-science-or-magic

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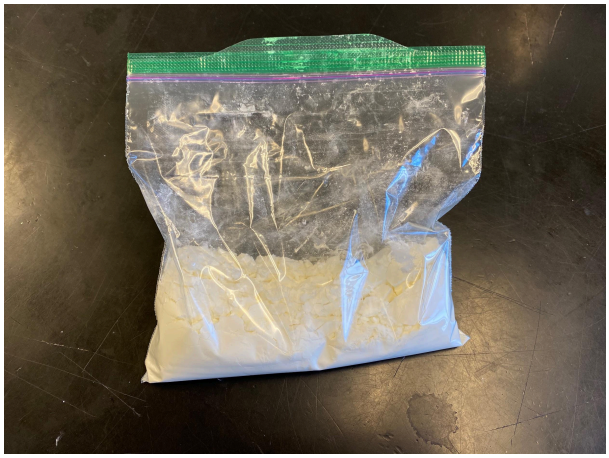
Oobleck

Introduction

Have you ever put your hands in something that was hard and soft at the same time! In this activity you will make “Oobleck” which is called a non-newtonian fluid (named after the famous scientist Isaac Newton). If you push down real hard on the oobleck it is very hard. If you push down slowly it is very soft and acts like a liquid. It is crazy stuff!



Equipment

- Corn Starch (75 grams)
- Water
- Bowl
- Spoon
- Food coloring (optional)

Pre-lab Questions & Answers:

1) Make sure you have all the materials you will need for your lab activities:

2) You will use 75 g of cornstarch to make oobleck. How many cups of cornstarch is equal to 75 g? (1 cup cornstarch = 130.09 g cornstarch) *show your work; don’t forget to apply sig figs & a unit to your final answer

Known = _____ Unknown = _____

Answer = _____

3) You will use 60 mL of water to make oobleck. How many cups of water is equal to 60 mL? (1 cup water = 237 mL water) *show your work; don’t forget to apply sig figs & a unit to your final answer

Known = _____ Unknown = _____

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Answer = _____

Procedure:

Oobleck

1) Into a small bowl, add the cornstarch from your lab kit (75 g).
2) Measure 60mL of water into the beaker from your lab kit and add 5 drops of food coloring (optional).
3) Pour the water into the bowl containing the cornstarch and gently mix with a spoon or your fingers.
4) Play with the oobleck!! Make sure to take some pictures. Here are a few things to try with your oobleck:
    a) Let your hand fall through the oobleck slowly, then try to quickly remove your hand.
    b) Scoop up some oobleck and squeeze it in your hand.
    c) Punch the oobleck slowly and quickly.
5) Clean-up: toss or wash the bowl with lots of soap & water, wash the spoon, & wash your hands.

Post-Lab Questions & Answers (for high school chemistry students):

1) You used 75 g of cornstarch ($C_{27}H_{18}O_{20}$) to make oobleck. How many molecules of cornstarch were in your oobleck? *show your work; don't forget to apply sig figs & a unit to your final answer

    Known = _____ Unknown = _____

    Answer = _____

2) You used 60 mL of water to make oobleck. How many molecules of water were in your oobleck? (1 mL water = 1 g water) *show your work; don't forget to apply sig figs & a unit to your final answer

    Known = _____ Unknown = _____

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Answer = _____

Resources

- Beals Science Video “100 Pounds of Oobleck”: https://youtu.be/ZeD5ayUFG4o

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Bread Clip Catapult

Equipment:

- Bread Clip
- Finger

Introduction:

Physics is the study of how and why things work. In this experiment you will get to make a simple catapult that will allow you to launch a bread clip at high speeds using only your fingers! How do you do it? Watch the video to learn the physics of how this works. Then, for the rest of your life, when you open a bag of bread, hopefully you will think about science (and maybe you will shoot your bread clip across the kitchen!).

Resources:

- Beals Science Video “Making Projectiles at Home”: https://youtu.be/xJ8wGxQutgE

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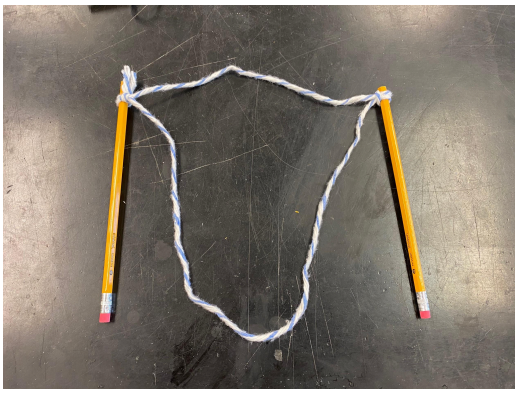
Giant Bubbles!

Introduction

Let's be honest, these bubbles are going to make you smile. Every time I make giant bubbles with my kids we all end up giggling, playing and smiling. And, I think we all could use a good smile and giggle right now. I spent a year testing and making different bubble solutions and I was able to make bubbles that were big enough to put a car inside! The bubbles you make in this experiment will not be quite as big but if you follow the instructions and make a big bucket of bubble solution and a GIANT bubble wand, you too can make bubbles big enough to fit inside! If you want to see the GIANT bubbles, watch the video: How to Make Giant Bubbles".

Equipment:

- Bubble Solution
  - Click here for my bubble recipes
- Pencils
- Yarn



Procedure

1. Make a triangle out of your yarn on the tabletop (it does not need to be perfect).
2. Tie one corner of a triangle to the end of one of your pencils.
3. Tie another corner of the triangle to the end of one of your pencils.
4. Let the other corner of the triangle hang down. This is your giant bubble wand.
5. Dip the entire piece of yarn into the bubble solution holding the pencil ends together inside the solution.
6. Lift the yarn out of the solution, keeping the pencil ends together.
7. As you move the pencils/yarn gently through the air, move the ends of the pencils apart so the yarn can spread out.
8. Make giant bubbles and smile!

Learn more about giant bubbles at:

https://www.bealsscience.com/post/how-to-make-giant-bubbles

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Screaming Balloon

Introduction

What is sound? Sound is just air that is vibrating. The vibrating air hits our ear drum and causes it to vibrate. Our brain senses that our ear drum is vibrating and tells the rest of the brain that we are hearing sounds. Different sounds are just different vibrations in the air! So, you can make sounds a lot of different ways but in this experiment you will learn how to make sound with a hex nut and a balloon! I like to think that this sound is “The Most Annoying Sound in the World”! Try it out and see if you agree.

Equipment

- Balloon
- Hex Nut

Instructions

1. Place the hex nut inside the balloon.
2. Blow up the balloon and tie it off.
3. Spin the balloon around so that the hex nut starts to roll around inside.
4. You will know you are doing it right when the balloon starts to SCREAM, letting out its frustration of COVID and isolation and all of the things that deserve a scream right now.
5. If you have different sized hex nuts, experiment with them to see if they produce the same sound!

Resources

- https://www.stevespanglerscience.com/lab/experiments/screaming-balloon/