MAD SCIENTIST EXPERIMENTS

KID FRIENDLY SCIENCE EXPERIMENTS FOR IN THE LAB OR AT HOME!

SOME NOT TOO SCARY EXPERIMENTS

HAVRE DE GRACE ENVIRONMENTAL CENTER

A huge thank you to all of those that attended the "Mad Scientist Experiments"! This was the Environmental Centers' first-ever Halloween lab event. We plan to have many more fun science and art events in the future, so stay tuned!

Enjoy some spooky Halloween recipes featured at the event in larger proportions and learn a bit more about the science behind it!

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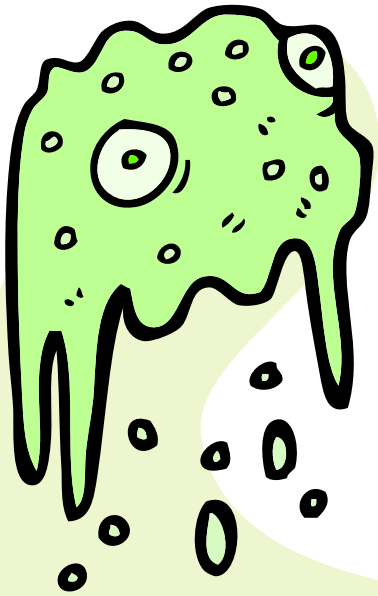
QUESTIONS, COMMENTS, CONCERNS, TROUBLESHOOTING? CONTACT US AT ENVIROCENTERATHDGMM@GMAIL.COM OR 410.939.4800

Halloween Slime

This is a fun and easy recipe that kids and parents can enjoy! You can play around with the mixture ratios as desired for different slime textures. An increased amount of Borax powder in the 1/2 cup of warm water will give a thicker slime texture while less Borax will give you a slimy and more watery texture.

Ingredients & Materials:

- Measuring Cup
- Mixing Spoon
- Mixing Bowls
- 1/4 Tsp of Borax
- 4 oz of Elmer's Glue (Clear or White)
- 2 1/2 Cups of Warm Water
- Food Coloring & Glitter Optional



Instructions:

Step 1: Dissolve 1/4 teaspoon of Borax powder into 1/2 cup of warm water in a bowl. Mix until dissolved.

Step 2: In a secondary bowl, measure out 4 oz of glue (roughly 1/2 cup) mix with 1/2 cup of warm water until fully incorporated. You can add in food coloring and glitter or other Halloween decorations for a more spooky appearance!

Step 3: Pour the Borax Water mixture slowly into the glue mixture and stir it up. Keep adding the Borax mixture in until the desired consistency is formed. There may be some Borax mixture leftover if you want a thicker slime.

STEAM Learning:

Slime is all about chemistry! Slime is a non-Newtonian fluid - it is neither a liquid or a solid. It can be picked up like a solid, but it can also flow like a liquid. Slime does not have its own shape. Place your slime into different shaped containers and watch it change its shape to fill whatever container it's placed in. Chemical bonds are formed when you mix Elmer's glue (polymer) and slime activator (the Borax mixture). The Borax mixture changes the position of the molecules in the glue in a process that is called cross-linking. A chemical reaction occurs between the glue and the borate ions, forming slime as the new substance, cross-linking changes the viscosity/flow of the new slime substance. Give your slime a pull; if it is on the thicker side, it will break apart because you are breaking the chemical bonds! If the slime is on the thinner side, give it a bounce, that's elasticity!

Bubbling Blob Creature

A recipe to create your very own bubbling blob creature, but be warned - the blob creature only lives for a short amount of time! This is a great sensory experiment and can last as long as several hours, depending on how fast you want the reaction to occur!

Ingredients & Materials:

- Measuring Cup
- Mixing Spoon
- Mixing Bowls
- 2 Cups of Vinegar
- 1 1/4 Tsp of Xanthan Gum
- Food Coloring and Halloween Decor Optional
- 1 Box of Baking Soda

Instructions:

Step 1: Pour the two cups of vinegar into a bowl. Add in the Xanthan gum slowly and stir vigorously until all of the gum has been added in. You can add in food coloring and other Halloween decorations like glitter, eyeballs, spiders, snakes, and more!

Step 2: Stir the slime until it is smooth (the color will be cloudy, don't worry). If you notice large white clumps of the Xanthan gum, you can let it sit in the fridge for one to two hours until the gum fully hydrates. You want the consistency to be gooey, not lumpy.

Step 3: Check the consistency by lifting some of the slime up on the whisk and letting it run back into the bowl. If the slime is too thick to run, add in some extra vinegar to help thin it out.

Step 4: In a separate bowl, cover the bottom with baking soda. The flatter the bowl bottom, the easier it is to see the reaction.

Step 5: Take your slime mixture and pour it over the baking soda. IT'S ALIVE! Watch as the slime begins to bubble up. For a faster reaction, you can stir the slime into the baking soda and add more vinegar, or you can let it sit for hours while it continues to bubble!

STEAM Learning:

Just like in the slime experiment, we have a similar chemical reaction where the Xanthan gum reacts with the vinegar, thickening into an ooey-gooey slime. We take this experiment a step further by adding the slime mixture to baking soda. Baking soda is a bicarbonate, and vinegar is an acetic acid. When baking soda and vinegar mix, a gas product called carbon dioxide is formed as well as water and sodium acetate. This gas forms the bubbles that we see in the slime, causing it to move in the bowl. Energy is needed to break down the vinegar and baking soda, which causes the temperature to drop. This is known as an endothermic reaction. An endothermic reaction is a chemical reaction that takes energy from its surroundings.

Witches Scrying Glass

Care to take a peep into a witch scrying glass? Witches and Wizards alike would try to take a look into the future using a mirror, just like a crystal ball. Take a try in your own scrying glass by watching colored dye dance about your milk plate!

Ingredients & Materials:

- Plate with lip (to ensure milk does not spill)
- Whole Milk
- Dish Soap
- Q-Tips
- Small bowl or cup
- Food Color

Instructions:

Step 1: Pour your whole milk onto a plate until you cannot see the bottom.
Step 2: Take some food coloring and place drops into the milk. Add as many or as little amounts as you like.
Step 3: Take your q-tip and place into a bowl of dish soap. Place the tip covered in soap into the milk. The coloring will begin to swirl around the tip. You do not stir, the reaction occurs by just placing the tip into the milk. Try placing the tip in different parts of your plate for the full effect!

STEAM LEARNING:

Whole milk is made mostly of water molecules, fat molecules, and protein molecules. Fat and protein molecules are bigger than water molecules. When you place the Q-tip with soap into the milk, the negative end of the soap molecules lines up with the positive end of the water molecules. The soap molecules will move out in every direction over the surface of the milk and push the food coloring out toward the edge of the plate. The surface tension of the milk is reduced by adding the soap. The negative charge on the detergent molecules is attracted to the positive parts of the protein molecules. And the uncharged part of the detergent molecules lines up with the uncharged fat molecules causing them to swirl around, which we see with the dye. Try this same experiment with another type of milk with varying fat content and observe how the soap interacts. You can try the same experiment using the same milk but different types of soap!

FLUORESCENT OOBLECK

Oobleck is a fun two-ingredient experiment with the addition of black light. When you move through the cornstarch and tonic water mixture, it will feel like a slimy liquid. If you tap hard on the mixture, it will act like a solid.

Instructions:

Step 1: Pour about 1/2 cup of cornstarch into a bowl.

Step 2: Slowly pour in tonic water, stirring your oobleck mixture. About a 1:1 ratio will give you the correct texture. Add tonic water or cornstarch as needed.

Step 3: Place your oobleck under some UV lighting and watch it fluoresce!

Optional: You can add food coloring or other decorations into your oobleck mixture for a Halloween vibe.

Ingredients & Materials:

- Tonic water that contains Quinine
- Cornstarch
- Mixing Bowl
- Food Coloring Optional
- Halloween Decor Optional

SOURCE: https://en.wikipedia.org/wiki/Tonic_water

Applying pressure to the mixture increases its viscosity. A quick tap on the surface of the oobleck will make it feel hard. This is because it forces the cornstarch particles together. Slowly moving your hands through the mixture makes it more fluid. You can triple the mixture amount in a large tub and try to walk on the oobleck!

STEAM LEARNING:

What is Ooblek? Oobleck is a non-Newtonian fluid that acts as both liquid and solid. Put it under pressure and it becomes a solid.

Tonic water is a carbonated beverage that has a chemical
called quinine dissolved in it. Quinine comes from the bark of a tree and had been used for treatment of malaria. When held under ultraviolet light, quinine shines a bright cyan blue. By mixing tonic water with cornstarch, you get a fluorescent creepy crawly goo.

You can take this experiment a step further by holding a bottle of tonic water under ultraviolet light and slowly add drops of bleach into it. Bleach is an oxidizer and will cause the quinine to no longer be able to absorb the UV lighting, stopping the blue glow.

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Witches Brew

A wicked awesome experiment that will be sure to leave a mess! Make sure that you work on a surface that can get wet. The unreacted hydrogen peroxide can irritate skin and eyes. Read the safety information on the hydrogen peroxide bottle. To be safe, make sure to wear safety glasses at all times. Try this brew with multiple colors and multiple cups at once!

Ingredients & Materials:

- Clear Cup or clean plastic bottle
- 3% Hydrogen Peroxide
- Three to Six tablespoons of warm water
- One packet of active dry yeast
- Mixing spoon
- Food Color Optional
- Liquid Dish Soap
- Mixing bowl and cup
- Safety Glasses
- Funnel
- Gloves if a higher percent of hydrogen peroxide is used

Instructions:

Step 1: In a mixing bowl or cup, add in one packet of active dry yeast and the tablespoons of warm water. Mix thoroughly.

Step 2: In your clear cup or bottle, squirt in some dish soap and add about half a cup of 3% Hydrogen peroxide. Mix thoroughly. Add food coloring if desired.

Step 3: Using your funnel, add in your yeast mixture to the hydrogen peroxide and soap mixture. Quickly remove the funnel and watch as your brew begins to bubble up!

Step 4: If you used the 3% percent hydrogen peroxide, the foam (mainly soap and yeast) is safe to touch. Do not get in eyes or mouth. You can hold the cup as the reaction occurs and feel the heat it produces!

STEAM LEARNING:

This experiment is a great example of an exothermic reaction! An exothermic reaction is a chemical reaction where the substances reacting release energy as heat. When you hold your cup or plastic bottle, you will be able to feel the energy being released. The active yeast acted as a catalyst (something used to speed up a reaction). The yeast broke apart the oxygen from the hydrogen peroxide quickly, which created a lot of bubbles. Because it did this very fast, it a foamy mixture quickly grew and flowed out of the cup/bottle.The foam produced is water, soap, and oxygen so you can clean it up with ease.

GUARDIAN SAFETY ADVISORY:

Dry ice is -109° F, which is cold enough to freeze skin cells, causing an injury similar to a burn. Never allow dry ice to come in contact with skin. Always handle dry ice with protective gloves or a towel. Dry ice converts to carbon dioxide gas. If left in a confined space, the carbon dioxide gas will displace oxygen and present a suffocation hazard. Dry ice should be used in well-ventilated areas. Do not store dry ice in a container that is completely airtight. When dry ice sublimates to carbon dioxide gas, the gas pressure greatly expands. This expansion will cause an airtight container to expand and possibly explode. Do not let children handle dry ice and all activities should be monitored by a responsible adult. Consult the instructions and warnings on dry ice packaging before use. The museum is not responsible for any injuries or damages. DO NOT leave dry ice in the sink or flush it down toilets.

GHOST BUBBLES

Ingredients: Dry Ice, Large Bowl, Soap Detergent, Gloves/Tongs

Conjure up some ghost bubbles in this spooky cool experiment that could leave you breathless! This experiment is quick but has other applications as well. Check online for other awesome experiments if you have any leftover dry ice at the end!

Instructions:
Step 1: Take an empty bowl and place it on a table or surface that you do not mind getting wet. Make sure the area is well ventilated.
Step 2: Spread some soap with a little bit of water on the surface that the bowl is on or place a towel down.
Step 3: An adult should use gloves or tongs to place the dry ice into the bowl. Do not touch with bare skin.
Step 4: Mix warm water and soap together and pour into the bowl. Watch as your ghost bubbles appear!

BOO!

STEAM LEARNING:

Soap bubbles are made of a film that has three layers: Soap, Water, Soap. Soap molecules are arranged in a way that they can attract and repel from one other, allowing the water and the soap to create bonds that give the water additional strength, making the bubbles last longer. The dry ice fog that you see is a combination of water vapor and carbon dioxide gas from the dry ice. Carbon Dioxide is heavier than air, which makes dry ice fog flow downwards. Placing the fog-filled bubbles on the surface with soap will allow the bubbles to grow larger and be moved around. The towel works similarly and lets the bubbles last longer. Try running a soapy string across the top of the bowl to capture the fog in one large bubble!

IMAGE SOURCE: https://www.survivingateacherssalary.com/one-hour-of-classroom-science-experiments-simple-dry-ice-experiments/

HAPPY HALLOWEEN!

The Environmental Center at the Havre de Grace Maritime Museum would like to wish everyone a happy and safe Halloween this year!

We want to thank everyone for attending the "Mad Scientist Experiments" on 10/27/19! The turn out was far beyond what we had expected for our first time running the event. Thank you for your patience and for your understanding as we worked together to create some fun and spooky Halloween science experiments. Please visit us again for more events!

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