DISCOVER

4-H KITCHEN SCIENCE CLUBS

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Description

The Discover 4-H Clubs series guides new 4-H volunteer leaders through the process of starting a 4-H club or provides a guideline for seasoned volunteer leaders to try a new project area. Each guide outlines everything needed to organize a club and hold the first six club meetings related to a specific project area.

Purpose

The purpose is to create an environment for families to come together and participate in learning activities that can engage the whole family, while spending time together as a multi-family club. Members will experiment with new 4-H project areas.

What is 4-H?

4-H is one of the largest youth development organizations in the United States. 4-H is found in almost every county across the nation and enjoys a partnership between the U. S. Department of Agriculture (USDA), the state land-grant universities (e.g., Utah State University), and local county governments.

4-H is about youth and adults working together as partners in designing and implementing club and individual plans for activities and events. Positive youth development is the primary goal of 4-H. The project area serves as the vehicle for members to learn and master project-specific skills while developing basic life skills. All projects support the ultimate goal for the 4-H member to develop positive personal assets needed to live successfully in a diverse and changing world.

Participation in 4-H has shown many positive outcomes for youth. Specifically, 4-H participants have higher participation in civic contribution, higher grades, increased healthy habits, and higher participation in science than other youth (Learner et al., 2005).

EXTENSION
UtahStateUniversity

Utah 4-H

4-H is the youth development program of Utah State University Extension and has more than 90,000 youth participants and 8,600 adult volunteers. Each county (Daggett is covered by Uintah County) has a Utah State University Extension office that administers the 4-H program.

The 4-H Motto

"To Make the Best Better!"

The 4-H Pledge

I pledge: My HEAD to clearer thinking, My HEART to greater loyalty, My HANDS to larger service and My HEALTH to better living, For my Club, my Community, my Country, and my world.

4-H Clubs

What is a 4-H Club? The club is the basic unit and foundation of 4-H. An organized club meets regularly (once a month, twice a month, weekly, etc.) under the guidance of one or more volunteer leaders, elects its own officers, plans its own program, and participates in a variety of activities. Clubs may choose to meet during the school year, only for the summer, or both.

Club Enrollment

Enroll your club with your local Extension office. Each member will need to complete a Club/member Enrollment form, Medical History form, and a Code of Conduct/Photo Release form (print these from the www.utah4h.org website or get them from the county Extension office).

Elect Club Officers

Elect club officers during one of your first club meetings. Depending on how many youth you have in your club, you can decide how many officers you would like. Typical officers will include a president, vice president, pledge leader, and secretary. Other possible officers or committees are: song leader, activity facilitator, clean-up supervisor, recreation chair, scrapbook coordinator, contact committee (email, phone, etc.), field trip committee, club photographer, etc. Pairing older members with younger members as Sr. and Jr. officers may be an effective strategy to involve a greater number of youth in leadership roles and reinforce the leadership experience for both ages. Your club may decide the duration of officers–six months, one year, etc.

A Typical Club Meeting

Follow this outline for each club meeting:

- ☐ Call to order–President
- ☐ Pledge of Allegiance and 4-H Pledge–Pledge Leader (arranges for club members to give pledge)
- ☐ Song–Song Leader (leads or arranges for club member to lead)
- ☐ Roll call–Secretary (may use an icebreaker or get acquainted type of roll call to get the meeting started)
- ☐ Minutes of the last meeting–Secretary
- ☐ Business/Announcements–Vice President
- ☐ Club Activity–arranged by Activity Facilitator and includes project, lesson, service, etc. These are outlined by project area in the following pages.
- ☐ Refreshments–arranged by Refreshment Coordinator
- ☐ Clean Up–led by Clean-up Supervisor

Essential Elements of 4-H Youth Development

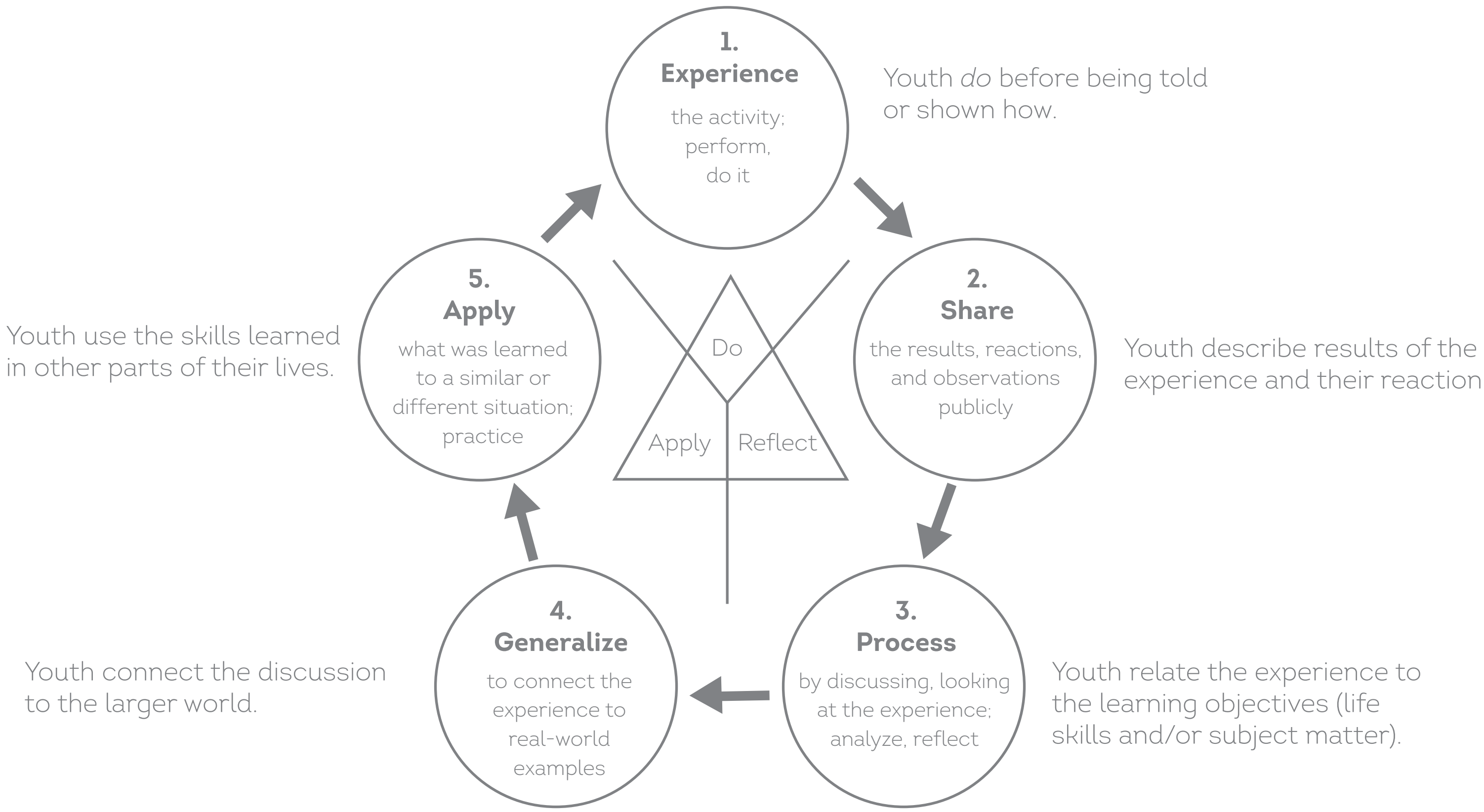
The essential elements are about healthy environments. Regardless of the project area, youth need to be in environments where the following elements are present in order to foster youth development.

1. **Belonging**: a positive relationship with a caring adult; an inclusive and safe environment.
2. **Mastery:** engagement in learning; opportunity for mastery.
3. **Independence:** opportunity to see oneself as an active participant in the future; opportunity to make choices.
4. **Generosity:** opportunity to value and practice service to others.

(Information retrieved from: http://www.4-h.org/resource-library/professional-development-learning/4-h-youth-development/youth-development/essential-elements/)

4-H "Learning by Doing" Learning Approach

The Do, Reflect, Apply learning approach allows youth to experience the learning process with minimal guidance from adults. This allows for discovery by youth that may not take place with exact instructions.



4-H Mission Mandates

The mission of 4-H is to provide meaningful opportunities for youth and adults to work together to create sustainable community change. This is accomplished within three primary content areas, or mission mandates, - citizenship, healthy living, and science. These mandates reiterate the founding purposes of Extension (e.g., community leadership, quality of life, and technology transfer) in the context of 21st century challenges and opportunities. (Information retrieved from: http://www.csrees.usda.gov/nea/family/res/pdfs/Mission_Mandates.pdf)

1. **Citizenship:** connecting youth to their community, community leaders, and their role in civic affairs. This may include: civic engagement, service, civic education, and leadership.
2. **Healthy Living:** promoting healthy living to youth and their families. This includes: nutrition, fitness, social-emotional health, injury prevention, and prevention of tobacco, alcohol, and other drug use.
3. **Science:** preparing youth for science, engineering, and technology education. The core areas include: animal science and agriculture, applied mathematics, consumer science, engineering, environmental science and natural resources, life science, and technology.

1. Recruit one to three other families to form a club with you.
   a. Send 4-H registration form and medical/photo release form to each family (available at utah4h.org)
   b. Distribute the Discover 4-H Clubs curriculum to each family
   c. Decide on a club name
   d. Choose how often your club will meet (e.g., monthly, bi-monthly, etc.)
2. Enroll your club at the local county Extension office
   a. Sign up to receive the county 4-H newsletter from your county Extension office to stay informed about 4-H-related opportunities.
3. Identify which family/adult leader will be in charge of the first club meeting.
   a. Set a date for your first club meeting and invite the other participants.
4. Hold the first club meeting (if this is a newly formed club).
   a. See A Typical Club Meeting above for a general outline.
      i. Your activity for this first club meeting will be to elect club officers and to schedule the six project area club meetings outlined in the remainder of this guide. You may also complete a-d under #1 above.
   b. At the end of the first club meeting, make a calendar outlining the adult leader in charge (in partnership with the club president) of each club meeting along with the dates, locations, and times of the remaining club meetings.
5. Hold the six project-specific club meetings outlined in this guide.
6. Continue with the same project area with the 4-H curriculum of your choice (can be obtained from the County Extension Office) OR try another Discover 4-H Club project area.

Other Resources

Utah 4-H website: www.Utah4h.org

National 4-H website: www.4h.org

4-H volunteer training:

To set up login: http://utah4h.org/htm/volunteers/get-involved/new-volunteer-training

To start modules: http://4h.wsu.edu/volunteertraining/course.html (password = volunteer)

References

Information was taken from the Utah 4-H website (utah4h.org), the National 4-H Website (4h.org), the Utah Volunteer Handbook, or as otherwise noted.

Lerner, R., M. et al., (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth grade adolescents: Findings from the first wave of the 4-H Study of Positive Youth Development. Journal of Early Adolescence, 25(1), 17-71.

We would love feedback or suggestions on this guide; please go to the following link to take a short survey:
https://docs.google.com/forms/d/1v6lW_Jm7WFcCHj-XlEYu0tZ-4EBo-BOdvOv48Ri9bM4/viewform

4-H KITCHEN SCIENCE CLUB *Meetings*

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DISCOVER
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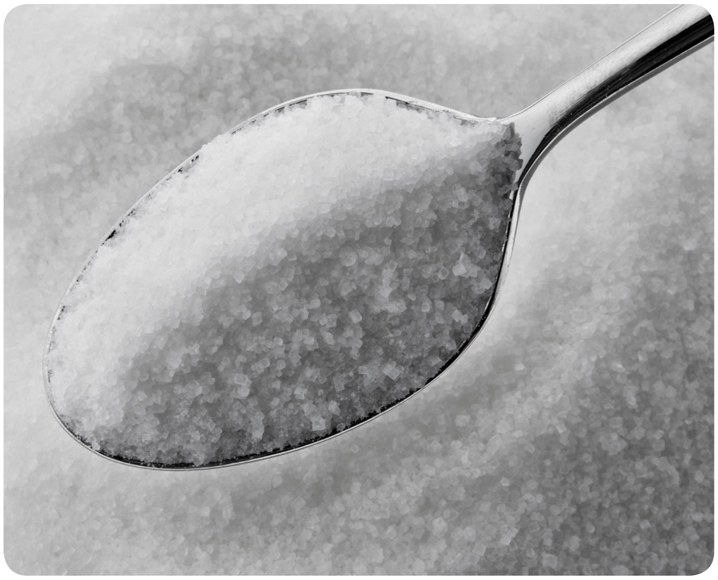
Club Meeting 1
Sugar Crystals/Homemade Slime



Supplies

- Paper
- Pens/pencils

Sugar Crystals

- 1 cup water
- 3 cups table sugar
- Clean glass jar
- Pencil
- String
- Pan/bowl for making solution
- Spoon

Homemade Slime

- 2 mixing bowls
- Measuring cup and spoons
- Glue
- Borax
- Ziploc bags
- Green food coloring
- Water

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will discover basic science principles found in making sugar crystals and slime!

WHAT TO DO

First, everyone should write their predictions on a piece of paper about what will happen during the experiments. This will be your science notebook.

Growing Sugar Crystals

EXPERIMENT 1: GROWING SUGAR CRYSTALS DIRECTIONS

Time: 20 minutes

1. Tie the string to a pencil. Set the pencil across the top of the glass jar and make sure that the string will hang into the jar without touching the sides or bottom. However, you want the string to hang nearly to the bottom. Adjust the length of the string if necessary.
2. Boil the water. If you boil the water in the microwave, be very careful when removing it to avoid getting splashed.
3. Stir in the sugar a teaspoonful at a time. Keep adding sugar until it starts to accumulate at the bottom of the container and won't dissolve even with more stirring. This means your sugar solution is saturated. If you don't use a saturated solution, your crystals will not grow quickly. On the other hand, if you add too much sugar, new crystals will grow on the undissolved sugar and not on the string.
4. If you want colored crystals, stir in a few drops of food coloring.
5. Pour your solution into the clear glass jar. If you have undissolved sugar in the bottom of your container, avoid getting it into your jar.

EXPERIMENT 1: GROWING SUGAR CRYSTALS CONTINUED

6. Place the pencil over the jar and allow the string to dangle into the liquid.
7. Set the jar somewhere that it can remain undisturbed. You can place a paper towel over the top of the jar to prevent dust from falling into it.
8. Let the crystals grow until they have reached the desired size or have stopped growing. At this point you can pull out the string and allow the crystals to dry. You can keep them or eat them. Enjoy!

Helpful tips: Crystals will form on cotton or wool string or yarn, but not on a nylon line. If you use a nylon line, tie a seed crystal to it in order to stimulate crystal growth.

Making *Slime*

EXPERIMENT 2: MAKING SLIME DIRECTIONS

Time: 20 minutes

1. Mix together ¾ cup warm water, 1 cup glue, and several drops of green food coloring in first bowl.
2. In second bowl, mix together 4 teaspoons of borax and 1 ⅓ cups warm water.
3. Pour contents of the first bowl into the second, but do not stir. Let sit for one minute then lift the now congealed slime out of the bowl.
4. Divide slime so that everyone has a piece to play with. The glue in slime can make it stick to certain fabrics. To minimize accidents, give everyone a Ziploc bag to take it home in.

At the end of the experiments, everyone should record their observations and the results of the experiments and then discuss them as a group.

Reflect

- How long did it take for the sugar crystals to grow?
- Were your predictions correct?
- Why did you have to boil the water to make the crystals grow?
- How do sugar crystals form?
- If you substituted salt for sugar, do you think you could make salt crystals?
- When making the slime, what happened when you added the borax to the warm water?
- Why did it stick together?
- Would it make a difference if you added more borax?

Apply

- Sugar crystals are also known as rock candy because the crystallized sucrose (table sugar) resembles rock crystals and because you can eat your finished product. The basic principle behind growing sugar crystals is to saturate the water with sugar to the point where the water can no longer contain all of the sugar molecules. When this happens, under the right conditions, the sugar will creep out of the water, forming crystals. This can either happen through over-saturation or evaporation. Evaporation is necessary for the crystals to form because if the water stayed, then the crystals would never form since they would be absorbed into the water. The evaporation causes the crystals to slowly form as the water leaves the container the sugar is in.
- The Steve Spangler slime recipe is based on the classic polyvinyl alcohol (PVA) formula with sodium tetraborate (borax) as the cross-linking agent. The PVA even has a preservative added to give it a longer shelf life and to prevent germs from infesting hands.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will discover basic science principles found in forming rock crystals and making slime.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.

References

Retrieved from: http://www.ehow.com/how-does_4568599_sugar-crystal-grow.html

Helmenstine, A.M. n.d. How to Grow Sugar Crystals–Make your own rock candy. Retrieved from: http://chemistry.about.com/od/growingcrystals/ht/blsugarcrystal.htm

Spangler, Steve. n.d. Steve Spangle Sciences. Retrieved from: http://www.stevespanglerscience.com/

Club Meeting 2

Cleaning Power of Taco Sauce/Egg in a Bottle

Supplies

- Paper
- Pens/pencils

Cleaning Power of Taco Sauce

- 20+ dirty pennies (try to collect tarnished pennies that all look the same)
- Taco sauce (mild sauce from Taco Bell works great)
- Vinegar
- Tomato paste
- Salt
- Water
- Small plates

Egg in a Bottle

- Wide mouth juice bottle
- Hardboiled eggs (medium sized)
- Strips of paper (2x6 inches)
- Matches
- Straw
- Vegetable oil

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will look at different chemical reactions in order to discover the secret cleaning power of taco sauce as well as learn about gravity and air pressure in an egg experiment!

WHAT TO DO

First, everyone should write their predictions in their science notebook about what will happen during the experiments.

Cleaning Power of Taco Sauce

EXPERIMENT 1: CLEANING POWER OF TACO SAUCE DIRECTIONS

Time: 25 minutes

1. Place several tarnished pennies on a plate and cover them with taco sauce. Use your fingers to smear the taco sauce all over the top sides of the pennies. Remember to wash your hands and don't lick your fingers (pennies are really dirty).
2. Allow the taco sauce to sit on the pennies for at least two minutes.
3. Rinse the pennies in the sink and look at the difference between the top sides that touched the taco sauce compared to the bottom sides. Taco sauce is an incredible cleaning agent!

Which ingredients are responsible for making the taco sauce work?

4. Place a couple of equally tarnished pennies on three different plates. Use a note card to keep track of which ingredients are on which penny.

EXPERIMENT 1: CLEANING POWER OF TACO SAUCE CONTINUED

5. Cover the pennies with the various ingredients (tomato paste, vinegar, salt) and allow them to sit for at least 2 minutes.
6. Rinse the pennies from each plate with water and write your observations in your science notebooks.

Did any of the cleaners work? No. All of the results showed they did a terrible job. As an experiment, let's combine two ingredients and see if we can get them to work together! For this test we will use different combinations of tomato paste, vinegar, and salt.

7. Place a couple of equally tarnished pennies on each of the three plates. Make three signs that say "tomato paste + salt," "tomato paste + vinegar," and "vinegar + salt."
8. Cover the pennies with each of the mixtures and give the ingredients at least two minutes to react.
9. Rinse the pennies under water and write your observations in your science notebooks.

Egg in a *Bottle*

EXPERIMENT 2: EGG IN A BOTTLE DIRECTIONS

Time: 15 minutes

1. The trick here is to find an egg that is just a little bigger than the mouth of the bottle; preferably a medium-sized egg. The other secret is to grease the mouth of the bottle with vegetable oil so the egg slides right in!
2. Start by smearing some vegetable oil around the mouth of the bottle.
3. Put the egg on the mouth of the bottle to show everyone that it does not fit into the bottle.
4. Have an adult light a match and set a strip of paper on fire. Quickly put the burning strip into the bottle. Be careful not to burn your fingers.
5. Immediately cover the mouth of the bottle with the egg. In just seconds the egg will start to wiggle around on the top of the bottle, the fire will go out, and some invisible force will literally "push" the egg into the bottle. That's amazing!
6. Now the challenge is to get the egg back out of the bottle. Use what you have learned about air pressure to come up with a way to get the egg out.

HINT: Try sneaking a straw alongside the egg when you pull it out. If the outside air can get inside the bottle, the egg will come out!

At the end of the experiments, everyone should write their observations and the results of the experiment and then discuss them as a group.

Reflect

- Which ingredients yielded the shiniest penny?
- What happened when we put tomato paste and vinegar on the penny?
- Were your predictions correct?
- Why didn't the salt and vinegar clean the pennies when they were put on separately?
- What did you learn from the taco sauce cleaning experiment?
- What else do you think you could clean using a vinegar and salt mixture?
- What caused the egg to fit through the mouth of the bottle?
- Why does the egg wiggle on the top of the bottle?
- How did you get the egg back out of the bottle?
- Do you think this experiment would work with a different item?

Apply

- The best penny cleaner was the mixture of vinegar and salt. Neither vinegar nor salt cleaned the pennies, but when mixed together they reacted chemically, which gave them new properties. Now you can clean all your pennies with taco sauce! Lemon juice and salt also work well for cleaning pennies and other metals.
- The burning piece of paper heats the molecules of air in the bottle and causes the molecules to move farther away from each other. Some of the heated molecules actually escape out past the egg, which is resting on the mouth of the bottle (that's why the egg wiggles on top of the bottle). When the flame goes out, the molecules of air in the bottle cool down and move closer together. This is what scientists refer to as a "partial vacuum." Normally the air outside the bottle would come rushing in to fill the bottle. However, the egg is in the way! The "push" or pressure of the air molecules outside of the bottle is so great that it literally pushes the egg into the bottle. Remember: when molecules of air heat up, they move farther apart from each other and take up more space. When molecules of air cool down, they move closer together and take up less space.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will learn basic principles about chemical reactions and air pressure.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.

References

Retrieved from: http://www.stevespanglerscience.com/

Club Meeting 3

Polymer Bouncy Ball/Grape Juice Rainbows

Supplies

- Paper
- Pens/pencils

Polymer Bouncy Ball

- Borax
- Warm water
- Cornstarch
- Food coloring (optional)
- Elmer's glue (white makes an opaque ball and clear makes a translucent ball)
- Measuring spoons
- Spoons
- 2 plastic cups
- Marking pen
- Ziploc bags

Grape Juice Rainbow

- Baking soda
- Vinegar
- Water
- Grape juice
- Measuring spoons
- 3 clear cups

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will make bouncy balls and learn about chemical reactions to find out how grape juice can bend light to make a rainbow!

WHAT TO DO

First, everyone should write their predictions in their science notebook about what will happen during the experiments.

Polymer *Bouncy Ball*

EXPERIMENT 1: POLYMER BOUNCY BALL DIRECTIONS

Time: 25 minutes

1. Pour 2 tablespoons of warm water and ½ teaspoon of borax powder into one cup. Stir the mixture to dissolve the borax. Add food coloring, if desired. Label this cup "Borax Solution."
2. In the second cup, pour in 1 tablespoon of glue. Add ½ teaspoon of the "Borax Solution" you just made and 1 tablespoon of cornstarch. Do not stir.
3. Allow the ingredients to interact on their own for 10-15 seconds and then stir them together to fully mix. Once the mixture becomes impossible to stir, take it out of the cup and start molding the ball with your hands.
4. The ball will start out sticky and messy, but will solidify as you knead it.
5. Once the ball is less sticky, you can bounce it!
6. Store your plastic ball in a sealed Ziploc bag when you are finished playing with it.
7. Do not eat the materials used to make the ball or the ball itself. Wash your work area, utensils, and hands when you are finished with this activity.

EXPERIMENT 2: GRAPE JUICE RAINBOW DIRECTIONS

Time: 20 minutes

1. In the first cup, dissolve 1 tablespoon of baking soda in ½ cup of water.
2. In the second cup, mix 1 tablespoon of vinegar with ½ cup of water.
3. Fill the third cup half full with grape juice.
4. Slowly add some of the baking soda mixture to the grape juice and observe what happens.
5. Now add some of the vinegar mixture and observe.
6. Repeat the experiment, but this time alternate the solutions by adding the vinegar mixture first, followed by the baking soda mixture.

At the end of the experiments, everyone should write their observations and the results of the experiment and then discuss them as a group.

Reflect

- Why do you think we added glue to the bouncy ball mixture?
- What happened once you started to knead the ball?
- How high did you get your ball to bounce?
- If you made another bouncy ball would you change the recipe? If so, how?
- What did the baking soda do to the grape juice?
- What happened when you added the vinegar?
- What colors did you see in this reaction?
- What happened when you alternated the order of the solutions?

Apply

- Balls have been toys for practically forever, but the bouncing ball is a more recent innovation. Bouncing balls were originally made of natural rubber, though now they can be made from plastics and other polymers, even treated leather. You have now used chemistry to make your own bouncing ball. Once you understand the basic technique, you can alter the recipe for the ball to see how the chemical composition affects the bounciness of the ball, as well as other characteristics. The bouncy ball in this activity is made from a polymer. Polymers are molecules made up of repeating chemical units. Glue contains the polymer polyvinyl acetate (PVA), which cross-links itself when reacted with borax.
- Vinegar is an acid and baking soda is a base. Whenever an acid and a base are mixed, they react chemically to produce a salt. The foaming grape juice in the experiment was the result of a chemical reaction. The different colors you saw came from the way the light bounced off the foaming grape juice. The foaming bubbles would bend, shape, and separate the light into its component colors. The changing thickness of the foam bubbles broke up the light to make tiny rainbows.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will discover how light bends to form a rainbow.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.

References

Retrieved from: http://mailjust4me.com/crafts/cookinupscience.htm

Club Meeting 4

Cornstarch Goo/Biodegradable Plastic

Supplies

- Paper
- Pens/pencils

Cornstarch Goo

- 1 box cornstarch (16 oz)
- Large mixing bowl
- Pitcher of water
- Spoon
- Food coloring
- Gallon-sized Ziploc bag
- Plastic drip cloth to cover floor
- Small plastic toy

Biodegradable Plastic

- Cornstarch
- Corn oil
- Ziploc bags
- Water
- Food coloring

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will learn about the forces of quicksand and how to make biodegradable plastic!

WHAT TO DO

First, everyone should write their predictions in their science notebook about what will happen during the experiments.

Cornstarch Goo

EXPERIMENT 1: CORNSTARCH GOO DIRECTIONS

Time: 25 minutes

1. Ask everyone to write what they know about quicksand and how they think it works. Tell them this experiment is a simulation of how quicksand works.
2. Pour approximately ¼ of the box (4 oz) of cornstarch into the mixing bowl and slowly add about ½ cup of water. Stir. Sometimes it is easier to mix with your bare hands (this can be really fun for the youth).
3. Continue adding cornstarch and water in small amounts until you get a mixture that has the consistency of honey. It may take a little work to get the consistency just right, but you will eventually end up mixing one box of cornstarch with 1-2 cups of water. Notice that the mixture gets thicker or more viscous as you add more cornstarch.
4. Sink your hand into the bowl of "quicksand" and notice its unusual consistency. Try moving your hand around slowly and then very fast. You can't move your hand around very fast! In fact, the faster you thrash around, the more like a solid the gooey stuff becomes.

EXPERIMENT 1: CORNSTARCH GOO CONTINUED

5. Sink your entire hand into the goo and try to grab the fluid and pull it up. That's the sensation of sinking in quicksand!
6. Try punching the cornstarch mixture.
7. Drop a plastic toy into the cornstarch mixture and then try to get it out. It's pretty tough even for an experienced quicksand mixologist.

IMPORTANT: The cornstarch will not stay mixed with the water indefinitely. Over time, the grains of cornstarch will separate from the water and form a solid clump. For this reason DO NOT pour this mixture down the drain. It will clog the pipes and stop up the drain. Pour the mixture into a Ziploc bag and dispose of it in the garbage.

Biodegradable *Plastic*

EXPERIMENT 2: BIODEGRADABLE PLASTIC DIRECTIONS

Time: 15 minutes

1. Place 1 tablespoon of cornstarch into a Ziploc bag.
2. Add 2 drops of corn oil and 1 tablespoon of water.
3. Mix the cornstarch, corn oil, and water in the plastic bag by rubbing the outside of the bag with your fingers.
4. Add 2 drops of food coloring and mix again.
5. DO NOT completely seal the bag.
6. Place the bag in the microwave on high for 20-25 seconds. Be careful!! It is hot.
7. Form your plastic into a ball (while it is still warm) and observe what it does.
8. Compare the newly made plastic to the plastic bag.

Reflect

- Why does it make a difference if we move our hands slowly or quickly through the cornstarch goo?
- What would change if we added more water to the mixture? Less water?
- How does quicksand work?
- From what you have observed in this experiment, what would be the best way to escape from quicksand?
- What did you notice about your biodegradable plastic?
- How is your plastic different from the plastic of the bag?
- What could you make with your plastic if you let it harden?
- What does it mean to be biodegradable?

Apply

- When you punch the cornstarch quicksand, you are forcing the long starch molecules closer together. The impact of this force traps the water between the starch chains to form a semi-rigid structure. When the pressure is released, the cornstarch flows again. Quicksand is nothing more than a soupy mixture of sand and water, where the sand is literally floating on water. Scientifically speaking, quicksand is actually a substance that behaves like both a solid and a liquid at the same time. This is the interesting sensation you experienced with the cornstarch and the water. Quicksand is just solid ground that has been liquefied by too much water. The term 'quick' refers to how easily the sand shifts when in this solid-liquid state. If a person were stuck in quicksand the natural instinct might be to thrash around to try and get out. In fact, this is the worst thing you could do because you only succeed in forcing yourself down farther into the quicksand pit. The best thing to do is to move slowly to bring yourself to the surface, lie back, and try to float on your back. According to the experts, you'll be able to use your arms to slowly paddle to safety. This activity is a great example of how to use a model to study something that most of us will never experience in person. While the cornstarch and water mixture is not real quicksand, its behavior is strikingly similar. The use of these kinds of models is an important part of a scientist's research into the unknown.
- Biodegradable plastic is plastic that decomposes naturally in the environment. This is achieved when microorganisms in the environment break down the structure of the plastic. However, for biodegradable plastic to be beneficial, it should be composted and not thrown away. These plastics are made from all natural plant materials such as corn oil, orange peels, starch, and plants. Traditional plastic is made from chemical fillers that can be harmful to the environment when released as the plastic is melted down.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will learn about the science of quicksand and how to use models to discover the unknown.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.

Citizenship

The youth will learn about being environmentally aware and how to help prevent toxic waste. This is a big step toward creating a better community and world.

References

Information retrieved from the following websites:

http://extension.usu.edu/AITC/teachers/pdf/fieldguide1/plastic.pdf

http://www.connecticutplastics.com/resources/connecticut-plastics-learning-center/biodegradable-plastics/

http://greenliving.nationalgeographic.com/benefits-biodegradable-plastic-2226.html

www.stevespanglerscience.com

Club Meeting 5
Freezing Soda/Bubble Gum Science

Supplies
- Paper
- Pens/pencils

Freezing Soda
- Carbonated water or soda (plastic bottle, NOT glass)
- Large bucket
- Ice
- Rock salt
- Thermometer

Bubble Gum Science
- Bubble Gum Kit (purchased from stevespanglerscience.com)

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will learn about temperature and freezing points of soda as well as bubble gum made from polymers!

WHAT TO DO
First, everyone should write their predictions in their science notebook about what will happen during the experiments.

Instant Freezing *Soda*

EXPERIMENT 1: INSTANT FREEZING SODA DIRECTIONS
Time: 25 minutes

1. The demonstration works best if you place the unopened bottles of soda in the refrigerator for a few hours before attempting the activity.
2. Start by filling the bucket ¾ full of ice. Cover the ice with a thin layer of rock salt.
3. Place the cooled bottles of soda in the ice-salt mixture.
4. Place the thermometer in the ice mixture. Position the thermometer as close to one of the bottles as possible to get the most accurate reading of the bottle temperature.
5. Watch the thermometer closely. The temperature of the soda needs to get down to about 17°F (-8°C) for approximately 10 minutes. If the soda gets any colder, the liquid will freeze prematurely.
6. Once the bottle has been at the appropriate temperature for 10 minutes, gently remove the bottle from the ice-salt mixture and open it.
7. Ice crystals should immediately form at the top of the bottle and quickly make their way down the bottle, creating an instant freeze.

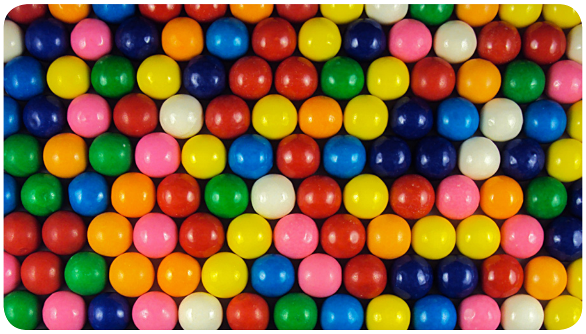
Remember: Never use glass bottles for this demonstration as the soda may accidentally freeze, causing the bottle to explode.

EXPERIMENT 2: BUBBLE GUM SCIENCE DIRECTIONS

Time: 25 minutes

1. Instructions for the "Bubble Gum Kit" are included with the kit.
2. This Bubble Gum Science Kit is one of Steve Spangler's favorite food science kits for kids. The easy-to-follow instructions will guide you through every step of the bubble gum making process. You will have about 125 grams (1/4 lb) of bubble gum ready to eat in less than 15 minutes from the time you open the kit.
3. Have a bubble blowing competition to see who can blow the biggest bubble.

At the end of the experiments, everyone should record their observations and the results of the experiment and then discuss them as a group.



Reflect

- What causes the soda to freeze so quickly?
- Would this experiment work with any other liquids?
- Why didn't the soda freeze when it was in the bucket of ice?
- Do you know the difference between bubble gum and chewing gum?
- What allows bubble gum to produce such large bubbles?
- What was one thing you liked about this activity?

Apply

- When soda is produced, large quantities of additives (like sugar and flavoring) and carbon dioxide bubbles are pumped into water to create bubbly, sugary soda pop. These additives are called solutes and when the solutes are added to a liquid such as water, the freezing point of the water decreases. By lowering the freezing point, the soda has to reach a much colder temperature than water to freeze. However, the concentration of carbon dioxide in the soda is only maintained as long as the bottle is kept sealed. As soon as the bottle is opened and you hear that "whoosh" of fizz (carbon dioxide) rushing out of the bottle, the concentration of solutes in the water goes down, and the freezing point goes up. Now, without all that extra carbon dioxide the soda will freeze more quickly.
- The difference between bubble gum and chewing gum is the gum base. Chewing gum base is a natural gum called chicle harvested from the sap of a tropical tree called a sopapilla tree. This kind of gum is chewy, but it will not produce a large bubble. Bubble gum base, on the other hand, is a mixture of starches and polymers made in a laboratory and specially formulated to produce bubbles. Believe it or not, chewing gum is actually beneficial. It relieves boredom, eases tension, and aids in concentration.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will learn basic principles about temperature and how to make a polymer.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.

References

Information retrieved from:

www.stevespanglerscience.com

Club Meeting 6
Homemade Ice Cream

Supplies
- Paper
- Pens/pencils

Homemade Ice Cream
- Sugar
- Milk or half and half
- Vanilla extract
- Rock salt
- Measuring cups and spoons
- Ziploc bags (pint sized)
- Large Tupperware container with lid
- Ice cubes
- Duct tape
- Cups
- Spoons

In this club we will explore basic chemistry, physics, and biology using common items from the kitchen. Today we will learn about physical changes of state and how to use your own energy to turn milk into ice cream in just 5 minutes!

WHAT TO DO
First, everyone should write their predictions in their science notebook about what will happen during the experiments.

Homemade *Ice Cream*

EXPERIMENT 1: HOMEMADE ICE CREAM DIRECTIONS
Time: 35 minutes

1. Fill the Tupperware container half full with ice. Add 6 tablespoons of rock salt.
2. In the Ziploc bag, put in ½ cup milk or half and half. Then add ¼ teaspoon of vanilla and 1 tablespoon of sugar.
3. Seal the bag and put duct tape around the opening of the bag to ensure that there will be no leaks.
4. Place the Ziploc bag inside the container and close the lid.
5. Shake vigorously for approximately 5 minutes until the mixture becomes ice cream.
6. When the ice cream is done, wipe off the outside of the bag, open it, and enjoy!

Tip: To make a larger amount, try doubling the recipe. Anything larger might be too big for kids to pick up because the ice is quite heavy.

At the end of the experiment, everyone should record their observations and the results of the experiment and then discuss them as a group.

Reflect

- Why do you add salt to the ice?
- Do you think the mixture would still turn to ice cream if you just let it sit and did not shake it?
- What ingredients could you add to give the ice cream flavor?
- What does this activity teach you about physical changes of state?
- How would it change the ice cream if you left out one of the ingredients?

Apply

- Ice has to absorb energy in order to melt, changing the phase of water from a solid to a liquid. When you use ice to cool the ingredients for ice cream, the energy is absorbed from the ingredients and from the outside environment (like your hands if you are holding the container of ice). When you add salt to ice, it lowers the freezing point of ice, so even more energy has to be absorbed from the environment in order for the ice to melt. This makes the ice colder than it was before, which is how your ice cream freezes. Ideally you should make your ice cream using "ice cream salt," which is sold as large crystals instead of the small crystals you see in table salt. The larger crystals take more time to dissolve in the water around the ice, which allows for even more cooling of the ice.

Science

Youth will explore chemical reactions and use the scientific method to form hypotheses and make observations. They will learn about physical changes of state and how to use their own energy to create ice cream.

Belonging

Working together as a group to conduct and explore these science experiments will create a sense of unity as youth work through failure and success.

Mastery

Not every experiment works the first time. Make sure youth follow the directions precisely, then keep trying until they are satisfied with the results.

Independence

The youth should make predictions and help conduct the experiments to find their own answers. Encourage them to look for solutions if there were any problems with the experiments.