DISCOVER

4-H EDIBLE SCIENCE CLUBS

EXTENSION
UtahStateUniversity

DISCOVER

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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 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 (Lerner et al., 2005).

Updated September 2017

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 are in your club, you can decide how many officers you would like. This will typically 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 6 months, 1 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 pledges)
- ☐ 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

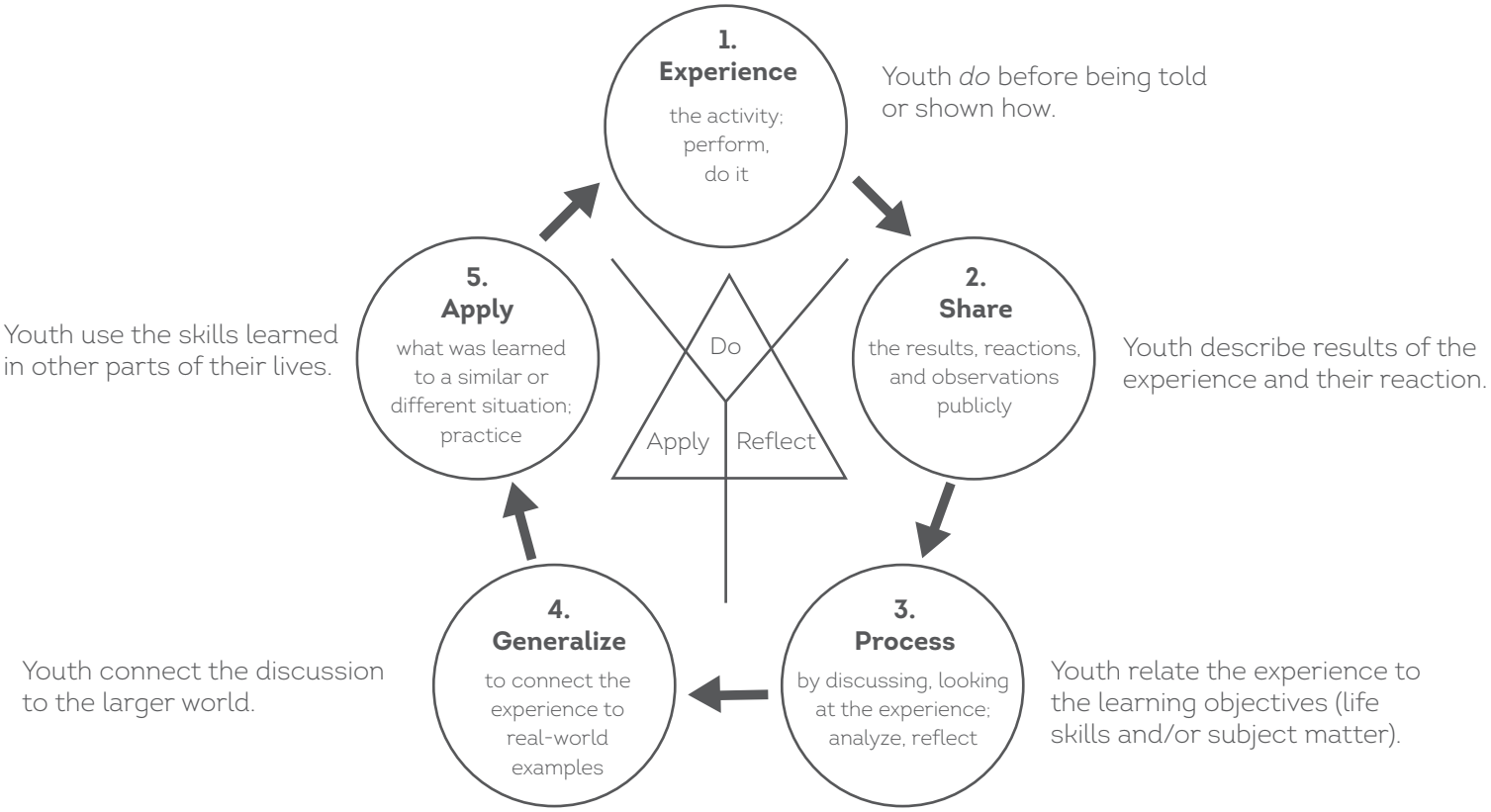
The essential elements are about healthy environments. Regardless of the project area, youth need to be in environments where the following elements are present in order to foster youth development.

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.

Getting Started

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 as a 4-H volunteer at the local county Extension office (invite other parents to do the same).
3. 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.
4. 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.
5. Hold the first club meeting (if this is a newly formed club).
    a. See *A Typical Club Meeting* section 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.
6. Hold the six project-specific club meetings outlined in this guide.
7. 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.4-h.org
4-H volunteer training:
To set up login:
http://utah4h.org/volunteers/training/
To start modules: http://4h.wsu.edu/volunteertraining/course.html
(password = volunteer)

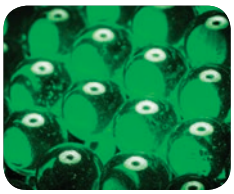
References

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:
Go to https://goo.gl/WH8Rqk or Click here to give your feedback

4-H EDIBLE SCIENCE CLUB *Meetings*



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Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- Honey
- Oil
- Water
- Syrup (chocolate, maple, etc.)
- Clear measuring cups

Activity 2 Supplies

- Clear plastic cups
- Assorted sodas (regular and diet)
- Bucket
- Water
- Ice
- Vanilla ice cream
- Syrup

INTRODUCTION

In this club meeting we will learn about density using common kitchen ingredients. First we will explore the basics of density with a density experiment, and then we will make our own experiment with soda!

Give a basic lesson on density and why different substances sink and float. Ask club members for examples of density they've seen. Have club members write in their science journals what they think will happen in the following experiments and why.

Activity #1
Basic Density

EXPERIMENT 1: BASIC DENSITY

TIME: 30 MINUTES

- Split club members into teams of 3-5 depending on group size. Have each member write down their predictions about the order ingredients will sink or float. Instruct them to compare their predictions with their group and come up with a final hypothesis as a team.
- Hand out supplies.
- Have each member take turns pouring in 2 tbsp-1/4 cup of each ingredient, honey, oil, water, syrup, into the glass. Instruct them to pour the substance they think will have the highest density first (the one that they put on bottom in their prediction), then the 2nd highest, etc.
- Were their predictions correct? Have students discuss why they chose the order they did, and come up with a theory for how you can tell how dense something is.
- Have students try mixing the ingredients in their cups. Do they re-separate? Why or why not?

EXPERIMENT 2: DENSITY SODA

TIME: 30 MINUTES

- Fill a large bucket or tank with water.
- Have students guess which soda cans will sink or float as you place them in the water.
- Discuss how sugar makes soda more dense.
- Have each student design their own soda concoction using different sodas, syrup, honey and ice.
- Pass out cups and sodas and individually repeat steps for experiment 1. They must pour carefully because the densities of most sodas are really close.
- Have students compare their sodas to other students. Why did some separate better than others?

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

Reflect

- Why do some substances float and others sink?
- Were your predictions correct?
- Why did some sodas just mix together?
- What formula did you come up with to see if something was more or less dense than something else? Use real world examples to see if it works.
- How could you use what you learned from this experiment at home?
- Do people have different densities?

Apply

- We use density every day. Have you ever ridden in a boat? Boats use density balance to stay afloat. Submarines also use density to dive lower in the ocean or come closer to the surface. Airplanes also use weight distribution through density to keep them flying. Density is in everyone's houses; plumbing systems are based on density to calculate liquid flow and drain it as well as bring it into your home.
- The study of density can also help the environment. In oil spills, oil floats on top of the water because it is less dense than water. Understanding density can help aid clean-up.

4-H MISSION MANDATES

Identify from citizenship, healthy living and/or science and explain why.

Citizenship

Youth learn about being environmentally friendly by learning about oil spills. This is a step toward developing accountable communities for a better world.

Science

Youth will learn about density and its real-world applications through this experiment. They will also learn about the scientific method and making observations.

ESSENTIAL ELEMENTS

Identify tips to include during the lesson and how it applies.

Belonging

Making hypotheses as individuals and then discussing and implementing them as a team develops understanding and communication skills needed for belonging.

Independence

Participants make their own predictions before discussing them with peers. They have the opportunity to design their own experiments and participate in self-led learning.

Mastery

Students are able to progress by having two experiments that build on each other. They can learn from their mistakes in the first experiment, and fix them in the second.

References:

Retrieved from: https://www.stevespanglerscience.com/lab/experiments/seven-layer-density-column/
https://www.stevespanglerscience.com/lab/experiments/sinking-soda-surprise/

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

Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- Glass jar for each group or participant
- Pan or bowl for making solution
- 3 cups sugar
- String
- 1 cup water
- Small plates
- Pencil & spoon

Activity 2 Supplies

- Starbursts (9 each)
- Foil & wax paper (1 square per participant)
- Oven
- Whipped cream
- Graham crackers
- Plate

INTRODUCTION

During this club meeting we will explore how different rocks are made, including: crystals, sedementary, metamorphic, and igneous. We will also learn the biggest rocks of all are formed, mountains!

Go on a short walk with youth to collect rocks and have them bring in their favorite one. Explain today's experiments and have them get out their science journals and write down predictions for today's experiments.

Activity #1
Growing Sugar Crystals

EXPERIMENT 1: GROWING SUGAR CRYSTALS

TIME: 20 Minutes

- Tie the string to a pencil. Set the pencil across the top of the glass jar and make sure 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.
- Boil the water. If you boil the water in the microwave, be very careful when removing it to avoid splashes.
- 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.
- If you want colored crystals, stir in a few drops of food coloring.
- 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 2: ROCK CYCLE

TIME: 15 Minutes

- Unwrap three Starbursts.
- Lay foil flat on the table and place wax paper on top. Stack three Sarbursts in the center of the wax paper.
- Tightly roll the papers over the Starbursts and form the foil around them.
- Repeat steps 1-3 three times as you do each experiment. You can reuse the foil and wax paper.
- Sedimentary: explain that sedimentary rocks are created with pressure over time. Have youth put as much pressure as they can on the Starbursts (standing on it works well) and try to change the shape of the rock with pressure alone. Have them unwrap and check out their sedimentary rocks.
- Metamorphic: Explain that metamorphic rocks are made with both heat and pressure. Place wrapped "rocks" in the oven for about 2 mins, foil should only be warm to the touch and Starbursts should be malleable but not melted. Unwrap "rocks" and have participants apply pressure and mold.
- Igneous: Explain that igneous rocks are made with extreme heat. Cook wrapped rocks in the oven for 5-10 mins, until they are liquid. Place on a towel for students to observe, and have an adult carefully open with oven mitts for students to watch. Have students discuss what is happening. They can pull it off of the wax paper once it has completely cooled.

EXPERIMENT 3: MAKING MOUNTAINS

TIME: 5

- Spread whipped cream over plate.
- Dip graham crackers in water for just a second.
- Lay graham crackers parallel to each other.
- Gently push together to see how mountains are formed.

At the end of the experiments, everyone should write their observations and the results of the experiment, 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?
- How are igneous, metamorphic, and sedimentary rocks different?
- What kind of rock is the rock you collected? How do you know?
- What else could we use to make rocks?
- Why do the graham crackers go up instead of down when you smash them together?

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 that 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, the crystals would never form because they would be absorbed into the water. The evaporation causes the crystals to slowly form as the water leaves the container.
- We use knowledge about the different kinds of rocks when doing construction. Concrete was invented by using knowledge about rock cycles, and it has revolutionized construction.
- Understanding mountain formation gives us the ability to predict earthquakes and minimize harm from them, as well as understand potential environmental impacts and changes.

4-H MISSION MANDATES

Science

Club members learn about rock cycles, substance formation, and earth sciences as well as continuing to develop their observation and hypothesis skills.

ESSENTIAL ELEMENTS

Belonging

Working with other students develops teamwork skills. Observing and sharing observations with fellow scientists promotes belonging and understanding.

Independence

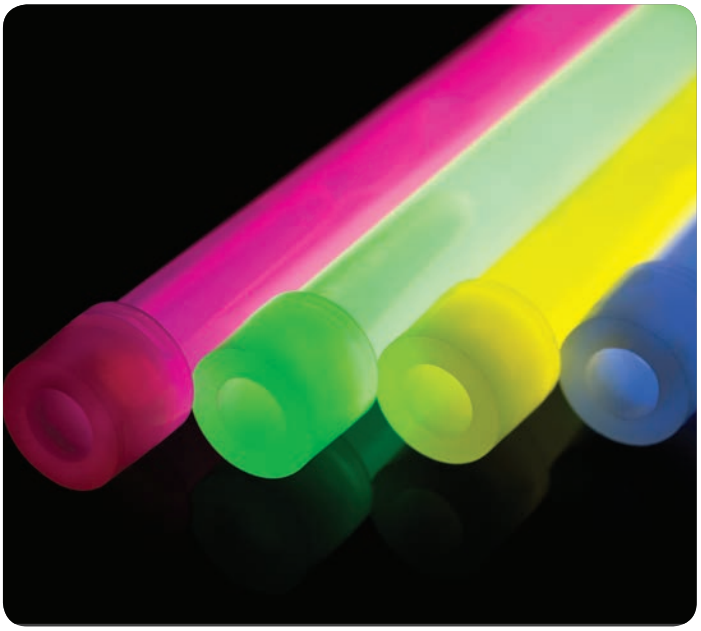
Youth made predictions based on what they have learned as they conducted their experiments. They are also given the opportunity to expand on this at home and participate in self-led learning.

Mastery

Repetition of the rock cycle experiment with different kinds of rocks helps develop mastery. Students are given a chance to learn and grow from their mistakes.

References:

Retrieved from: http://utah4h.org/discover/ science in the kitchen
http://lemonlimeadventures.com/edible-rock-cycle-for-kids/#_a5y_p=1341452
http://we-made-that.com/how-are-mountains-made/



Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- Cups
  Popsicle sticks or spoons
- Red, yellow & blue paint
  Paper
- Red, yellow & green glow sticks (1 of each per participant)
- 2 plates per participant
- Spoons
- 2 plastic cups
- Marking pen
- Color wheel

Activity 2 Supplies

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

INTRODUCTION

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!

Ask participants to write their predictions in their science notebook about what will happen during the experiments.

Activity #1

Color: Light vs. Pigment

EXPERIMENT 1: LIGHT VS. PIGMENT COLORS

TIME: 25 Minutes

- Explain the red, yellow, and blue color wheel as you pass out a plate and three cups with red, yellow, and blue paint to each group or individual.
- Have students create and label their own color wheels with primary, secondary, and tertiary colors.
- Have students make their own art on a separate piece of paper using the colors they have made.
- Discuss how light colors are different from pigment colors as you hand out a red, green, and blue glow stick to each club member.
- Have students make a hypothesis about what color each combination of glow sticks will make, and carry out their experiments on a new paper plate.
- Have students try to make a light color wheel.

EXPERIMENT 2: GRAPE JUICE RAINBOWS

TIME: 20 Minutes

- In the first cup, dissolve 1 tablespoon of baking soda in ½ cup of water.
- In the second cup, mix 1 tablespoon of vinegar with ½ cup of water.
- Fill the third cup half full with grape juice.
- Slowly add some of the baking soda mixture to the grape juice and observe what happens.
- Now add some of the vinegar mixture and observe.
- 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 does light make different colors than pigment?
- What are the similarities and differences between them?
- What do you think would happen if we used colors other than the primary colors?
- 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

- The reason that light makes different colors than pigment is because pigment absorbs some colors, so the color that you see in pigment is a mixture of all of the colors of light that a pigment doesn't absorb. Light color, however, is seen just as the colors that the light is emitting, and so they have different properties. This is important to understand, because it shows us how sight works.
- 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.

4-H MISSION MANDATES

Science

Participants learn how we see colors, the difference between light and pigment colors, and how light is refracted to create color.

ESSENTIAL ELEMENTS

Belonging

Taking care of surroundings and allowing others to enjoy the same experiences in nature can inspire a sense of belonging to youth.

Independence

Club members make their own hypothesis, carry out individualized experiments, and are encouraged to explore beyond the curriculum by providing time to ask questions and find their own answers.

Mastery

Mastery is encouraged in these experiments because the simple concept of the color wheel provides a base for more complicated concepts like light and color, and refraction.

References:

Retrieved from: http://mailjust4me.com/crafts/cookinupscience.htm
http://utah4h.org/discover/ kitchen science curriculum

Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- Light colored Jell-O
- Mixing bowl & spoon
- 16 oz tonic water
- Stove
- Pot
- Fridge
- Liquid measuring cup
- Black light lamp bulbs

Activity 2 Supplies

- Bag of washed potatoes
- Food processor/knives
- Water
- 2 mixing bowls
- Strainer

INTRODUCTION

During this lesson, we will build on our last lesson about light and color by exploring how black light works. We will also be learning about basic chemical properties.

Have several liquids in different cups and have students guess which will glow under black light and why. Then turn off the lights. Explain to students why tonic water glows under black light. Have them write down predictions for the following experiments.

Activity #1
Glowing Jell-O

EXPERIMENT 1: GLOWING JELL-O

TIME: 25 MINUTES

- Measure out tonic water and pour into a pot with the burner on high.
- Pour Jell-O packet into mixing bowl and then pour boiling tonic water into the mixing bowl.
- Stir until dissolved.
- Add 1 cup of cold tap water to the mixing bowl. If you want it to glow more brightly, add tonic water instead of tap water. However, it will make Jell-O taste bitter.
- Chill in the fridge with the settings set as cold as possible. Chill while you complete the next experiment.
- Turn out all of the lights and shine a black light on the Jell-O. You now have glowing Jell-O!

EXPERIMENT 2: MAGIC MUDD

TIME: 45 MINUTES

- Have students discuss things that glow naturally along with the properties of quick sand.
- Explain what bioluminescence is and why it is advantageous to certain species.
- Finely chop potatoes and place in mixing bowl.
- Pour in enough hot water to just cover them completely.
- Stir well.
- Strain mixture into another bowl and discard the potatoes
- Wait for mixture to settle (about 10 mins), a white layer should develop at the bottom of the bowl. Pour brown water off the top into sink, you should be left only with the white substance.
- Add clean water and separate again, pouring excess water in the sink.
- Squeeze all the water from the mixture and discard.
- Add tonic water until mixture is the consistency of putty.
- The youth can play with it under the black light with all the lights off.
- IMPORTANT: The potato starch will not stay mixed with the water indefinitely. Over time, the grains of potato starch 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.

Reflect

- Why does it make a difference if we move our hands slowly or quickly through the Magic Mudd?
- What would change if we added more tonic water to the mixture? Less tonic water?
- How does quicksand work?
- From what you have observed in this experiment, what would be the best way to escape from quicksand?
- What makes the Jell-O glow?
- How is the Jell-O glowing differently than magic mud? How could your family members use tonic water?
- What does it mean to be bioluminescent?

Apply

- When you punch the magic mudd, 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 starch 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 potato starch 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 potato starch 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.

- Bioluminesence is when a living organism glows. There are different chemicals that cause organisms to glow, such as luciferin, luciferase, and in the case of our Jell-O and Magic Mudd, quinine. Some sailors use bioluminescent algae that glow when they are struggling to see their way home. Angler fish (like the one on Finding Nemo) use bioluminescence to lure prey. Insects (glow worms and lightning bugs), deep sea ocean animals (sperm whales and angler fish), and plants (lantern mushroom and algae) are the most common forms of bioluminescence.

4-H MISSION MANDATES

Science

Club members learn about light in their everyday lives, bioluminescence and how it benefits humans and animals alike, and the beginning properties of non Newtonian fluids

ESSENTIAL ELEMENTS

Belonging

Working with other students develops teamwork skills. Observing and sharing observations with fellow scientists promotes belonging and understanding.

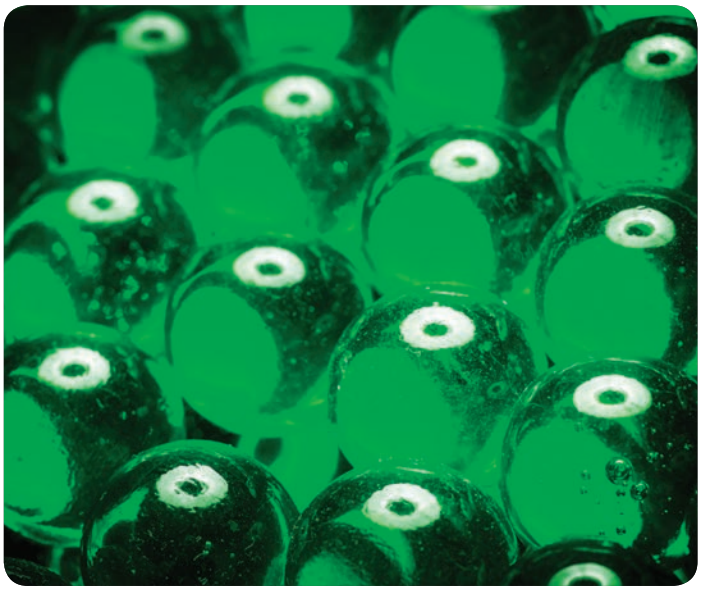
Independence

Club members make their own hypothesis, carry out individualized experiments, and are encouraged to explore beyond the curriculum by providing time to ask questions and find their own answers.

Mastery

4-Hers are given the opportunity to build upon previous concepts in the color section by exploring abnormal light properties and participating in a simple experiment, then a more complex one.

References:
Information retrieved from the following websites:
http://www.instructables.com/id/Glow-in-the-Dark-Jello/
https://www.youtube.com/watch?v=_0J4dRqg7CE



Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- Office supplies
- 2 ping pong balls
- Spoon
- Funnel
- Straw

Activity 2 Supplies

- Spherification kit (purchase online)

INTRODUCTION

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!

Discuss with club members what a fluid is. Have club members discuss what they know about fluids and make predictions for the following experiments in their science journals.

Activity #1
Fluid Basics

EXPERIMENT 1: FLUID BASICS

Time: 20 Minutes

- Choose several activities from the link below to learn about the basics of fluids
  http://www.livescience.com/42579-fluids-science-experiments.html
- Have students record their findings in their science journal.
- Have students design their own fluid experiments in teams of 3-5 using available resources and the scientific method.
- Discuss experiments and results with club members. What new properties are consistent in fluids?

EXPERIMENT 2: SPHERIFICATION

Time: 25 Minutes

- Discuss with club members that there are some fluids that don't follow regular tested properties. There are two main types: non-Newtonian and active fluids. Non-Newtonian fluids don't follow Newton's laws of nature. Explain that they made a non-Newtonian fluid the previous week (their magic mudd) and have some with you to display and test. Ask students which Newtonian properties it doesn't follow as they play with it.
- Next teach club members about active fluids. Active fluids change their properties based on chemical reactions and mixing with other substances. For example, the algae you'll be using in this experiment acts as a powder/solid when dehydrated, and acts as a gel or liquid, depending on how much water you add. Ask students what active liquids they have in their home (i.e., Jell-O, hairspray, gell, etc.)
- Follow the instructions that come with the spherification kits.
- Challenge youth to see if they can make different shapes or discover what happens when you use different amounts of different ingredients or mix them in a different order.

Reflect

- What results did you get from your fluid experiments? Were they what you expected?
- How did you use supplies and the scientific method to test your theories on fluid?
- What's the difference between fluid and non-Newtonian fluid?
- What are active fluids?
- What surprised you about these experiments?

Apply

- A fluid is a substance that has no fixed shape and yields easily to external pressure. It is often a liquid or a gas. One of their properties is called viscosity (or reaction to stress). A theory was developed by Isaac Newton that fluids regularly became more movable when stress was applied (i.e., water moves faster when you push on it than when it just sits still). Non-Newtonian fluids actually become less movable when stress is applied, hence their name.
- Active fluids behave like fluids but change their properties based on their interactions with other substances. Gelatin is often a main ingredient of these kinds of fluids.

4-H MISSION MANDATES

Science

Students learn the basic properties of fluids, the scientific method, and about active and non-Newtonian fluids in this lesson.

ESSENTIAL ELEMENTS

Belonging

Working with other students develops teamwork skills. Observing and sharing observations with fellow scientists promotes belonging and understanding.

Independence

4-Hers are given the opportunity to design their own experiments to test the concepts they have learned as well as being empowered to go beyond the curriculum by experimenting further.

Mastery

This experiment builds on students' basic knowledge of fluids by having them design their own experiments to test principles and by adding in exceptions and more complicated concepts. It also allows mastery by connecting this lesson to the previous one.

References:

Information retrieved from:
http://www.tested.com/food/43811-more-on-spherification/
http://www.livescience.com/42579-fluids-science-experiments.html
https://www.exploratorium.edu/science_explorer/ooze.html

4-H Club Meeting 6
Chemical Reactions

Supplies

- Paper
- Pens or pencils

Activity 1 Supplies

- ½ cup flour
- 2 tbsp. salt
- 1-2 tbsp. ground spice
- ½ cup water
- 1 tsp cream of tarter

Activity 2 Supplies

- 1 cup flour
- 1 tbsp. oil
- 1 cup water
- ½ cup salt
- 2 tsp. cream of tarter
- 1 Jell-O package

Activity 3 Supplies

- 2 tsp. Jell-O
- 1 tsp. baking soda
- 1 tsp. citric acid
- 2 tbps. powdered sugar

INTRODUCTION

During this club we will explore chemical reactions. We will learn about the difference between mixing substances and chemical reactions while making herb dough, hydrolysis reactions when making Jell-O putty, and acid-base chemical reactions when making sherbet.

First, ask students what they know about chemical reactions. Give them some examples like making salad or baking cookies and ask them if it is a chemical reaction. Then have them write predictions for the following experiments in their science journals.

Activity #1
Homemade Herb Dough

EXPERIMENT 1: HOMEMADE HERB DOUGH

Time: 15 Minutes

- Add dry ingredients to a sauce pan and slowly add in the water. For suggestions on what herbs to use, visit: http://craftulate.com/homemade-herb-and-spice-play-dough/, Explain that just mixing the ingredients is not a chemical reaction because it is still possible to re-separate the ingredients.
- Cook over medium-low heat, stirring constantly, until dough forms into a ball. Explain that the dough thickens and starts to look more like play-dough because of a starch chemical reaction. Starch is present in flour (as well as potatoes, as we saw in an earlier experiment). When it is at room temperature, starch doesn't combine with other starch molecules. However, when it's warmed up they attach to each other, making the dough become thick.
- Place on wax paper to cool.
- After the dough is cool, knead until smooth.
- Have students compare different doughs to and record their observations.

Activity #2
Jell-O Putty

EXPERIMENT 2: JELL-O PUTTY

Time: 15 Minutes

- Combine all dry ingredients in a pot.
- Add in oil and flour. Ask students if this is a chemical reaction, and why or why not? (It is.) Explain that hydrolysis is when a weak acid or a weak base is dissolved in water, turning a polymer (large molecule made of small molecules bonded together) into a monomer (small molecules) so they can fit closer together, thickening the mixture. Explain that this is happening with the oil and flour.
- Cook on medium heat, stirring constantly until it is the thickness of mashed potatoes. Ask students if this is a chemical reaction, why and why not? (It also is.)
- Allow dough to cool.
- Knead dough while sprinkling flour until it is dry to the touch.
- Have students compare dough, with more and less flour and record their results in their science journals.

Activity #3
Fizzy Sherbet

EXPERIMENT 3: FIZZY SHERBET

Time: 35 Minutes

- Measure ingredients into a bowl.
- Mix and taste test to see what it needs more or less of. Sugar adds sweetness, citric acid makes it fizzier, and Jell-O adds flavor. While you're mixing, explain that this is an acid-base reaction. When an acid (citric acid) and a base (baking soda) are mixed, they react to neutralize the acid and base properties, creating the fizz.
- Have 4-Hers compare results and record them in their science journals.
- Store in the freezer.

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

Reflect

- What is a chemical reaction?
- Do you think the mixture would still turn to ice cream if you just let it sit and did not shake it?
- What made the herb dough become thick when cooking it?
- What would happen if we left out an ingredient?
- Where else have you seen starch, hydrolysis, and acid-base reactions?

Apply

- Starch chemical reactions happen all the time while baking. Making bread, cooking potatoes, gravy, alfredo sauce, and pretty much any thickening sauce happens through starch reactions.
- Soap, salt, sugar, insecticides, digestion of food, and even explosive materials are made possible by hydrolysis reactions.
- Acid-base reactions are used in farming to neutralize acidic or basic soil so plants can grow in it. It is also used in medicine to treat gastric patients, and in cleaning. Acid-base reactions can be used to cure stings! Wasp venom is a base. If you add vinegar, an acid, it will neutralize the sting and make it hurt less. A bee sting is acidic, and so you can neutralize it with baking powder or another base. When washing our hair, we use both shampoo and conditioner because shampoos are a base and make hair unmanageable, so they are neutralized with a slightly acidic conditioner.

4-H MISSION MANDATES

Identify from citizenship, healthy living and/or science and explain why.

Science

Youth will explore chemical reactions, specifically about starch chemical reactions, hydrolysis and acid-base reactions through creating their own.

ESSENTIAL ELEMENTS

Identify tips to include during the lesson and how it applies.

Belonging

Working with other students develops teamwork skills. Observing and sharing observations with fellow scientists promotes belonging and understanding.

Independence

4-Hers are given the opportunity to design their own experiments to test the concepts they have learned and are empowered to go beyond the curriculum by experimenting further.

Mastery

This experiment allows mastery by teaching the basics of chemical reactions and then slowly adding more complicated concepts.

References:
Retrieved from:
http://craftulate.com/homemade-herb-and-spice-play-dough
http://thekrazycouponlady.com/tips/family/diy-have-fun-with-jell-doh/
https://gosciencegirls.com/fizzy-sherbet/

Continue Discovering

More to Discover

Congratulations on completing your Discover 4-H club meetings! Continue with additional curriculum in your current project area, or discover other 4-H project areas. Check out the following links for additional 4-H curriculum.

1. www.discover4h.org
2. http://www.4-h.org/resource-library/curriculum/
3. http://utah4h.org/curriculum/

Become a 4-H Member or Volunteer

To **register** your Utah club or individuals in your club visit and contact your County Extension Office

http://utah4h.org/about/

http://utah4h.org/join/index

For help registering in 4-H online visit:

http://utah4h.org/staffresources/4honlinehelp

Non-Utah residents, please contact your local 4-H office:

http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Stay Connected

Visit Your County Extension Office

Stay connected with 4-H activities and news through your county Extension office. Ask about volunteer opportunities, and don't forget to register for your county newsletter. Find contact information for counties in Utah here:

https://extension.usu.edu/locations

Enjoy the Fair!

Enter your project or create a new project for the county fair. Learn about your county fair and fair judging here:

http://utah4h.org/events/index

Participate in Local or State 4-H Activities, Programs, Contests, or Camps

For Utah state events and programs visit:

http://utah4h.org/events/index

http://utah4h.org/projects/

For local Utah 4-H events and programs, visit your county Extension office.

https://extension.usu.edu/locations

Non-Utah residents, please contact your local 4-H office.

http://www.4-h.org/get-involved/find-4-h-clubs-camps-programs/

Discover *Service*

Become a 4-H Volunteer!

http://www.youtube.com/watch?v=UBemO5VSyK0

http://www.youtube.com/watch?v=U8n4o9gHvAA

To become a 4-H volunteer in Utah, visit us at:

http://utah4h.org/join/becomevolunteer

Serve Together as a 4-H Club or as an Individual 4-H Member

Use your skills, passions, and 4-H to better your community and world. You are needed! Look for opportunities to help in your area or participate in service programs that reach places throughout the world (religious groups, Red Cross, etc.).

Hold a Club Service Project

USU Collegiate 4-H Club hosted "The Gift of Giving" as a club activity. Club members assembled Christmas stockings filled with needed items for CAPSA (Community Abuse Prevention Services Agency).

http://tinyurl.com/lu5n2nc

Donate 4-H Projects

Look for hospitals, nursing homes, or other nonprofit organizations that will benefit from 4-H projects. Such projects include making quilts for CAPSA or Primary Children's Hospital, or making beanies for newborns. During Utah 4-H State Contests, 40 "smile bags" were sewn and donated to Operation Smile.

Partner with Local Businesses

92,000 pounds of processed lamb, beef, and pork were donated to the Utah Food Bank in 2013 by multiple companies.

http://tinyurl.com/pu7lxyw

Donate Money

Clubs or individuals can donate money gained from a 4-H project to a worthy cause. A nine-year-old 4-H member from Davis County donated her project money to help a three-year-old battle cancer.

http://tinyurl.com/mqtfwxo

Give Us Your *Feedback*

Help us improve Discover 4-H curriculum. We would love feedback or suggestions on this guide. Please go to the following link to take a short survey:

Click here to give your feedback