Milk Plastic

Sections

Joey Scouts
Cub Scouts
Scouts
Venturer Scouts
Rover Scouts

Scouts VICTORIA

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Challenge Areas

COMMUNITY
CREATIVE
OUTDOOR
PERSONAL GROWTH

Scout Method Elements

COMMUNITY INVOLVEMENT
LEARNING BY DOING
NATURE AND THE OUTDOORS
PROMISE AND LAW
PERSONAL PROGRESSION
PATROL SYSTEM
SYMBOLIC FRAMEWORK
YOUTH LEADING, ADULTS SUPPORTING

SPICES Growth Areas

CHARACTER EMOTIONAL INTELLECTUAL PHYSICAL SOCIAL SPIRITUAL

The Adventure

Learn about the properties of both plastic and milk by making your own plastic.

Plan

1. Investigate the components of plastic, how it is traditionally made, and some of the properties that it has.
2. Investigate the components of milk, especially milk protein (casein). Some things that you might like to investigate how the different components of milk interact and exist when sitting in a glass as well as aspects such as what proteins are.
3. Investigate some of the properties of vinegar including aspects relating to its pH, and why a reaction might occur between the milk and the vinegar. There are a lot of useful resources for this but you may find these ones from Little Bins for Little Hands and Science Buddies as a useful place to start,
4. Consider and determine what shape you might like to make out of your milk plastic and if you would like to draw on it.
5. Read the safety information and discuss with your leaders or another appropriate adult what safety equipment, precautions, and supervision may be required. Ensure that you have these safety measures in place before starting the 'Do' section.
6. Gather the equipment and ingredients you need to make your plastic. You will need milk, a heat source, vinegar, a strainer and/or some cheesecloth, paper towel, permanent markers (optional).

Do

1. Make sure everyone knows the safety requirements and are wearing correct protective equipment.
2. Make your milk plastic by:
    a. Heat a cup of milk in the microwave for 90 seconds. If you don't have a microwave handy, the milk can also be heated on the stove or over a campfire but it is important that you do not let the milk boil.
    b. Add 4 tablespoons (~60 mL) of vinegar and stir for 60 seconds. During this step, white curds will form.
    c. Pour the curdled mixture through a strainer or some cheesecloth and press out as much liquid as possible. Be careful when you are doing this as the liquid may still be hot. You can also press some paper towels into the curds to remove any excess liquid.
    d. Place your milk plastic on some paper towel and mould into your desired shape. You could also use a cookie cutter to cut out a shape.
    e. Leave your milk plastic to set. This can take up to 48 hours.
    f. Optional: Using permanent markers, colour or draw patterns on your milk plastic.
3. Record your results, observations, and any variations for the method.
4. If you want and have time, you could try the experiment again using different types of vinegar or animal milk (for instance low fat, full fat, lactose free, goats, etc). How does this affect the plastic produced? By keeping the amounts used consistent, you can weigh your dried plastic to see which combination provides the most plastic.

Review

1. Did your experiment go as expected? Why or why not?
2. What did you enjoy the most from this experiment? What did you learn?
3. If you were to do this activity again what would you do the same? What would you do differently?
4. What else do you think could be made from milk, especially milk protein?
5. What properties does your milk plastic have and how does it compare to non-milk plastic?
6. If you did point 4 in the 'Do' section, hypothesise why or why not the amount of milk plastic produced may differ depending on the variable.

Safety

- This activity requires the heating of milk. Adult supervision or assistance may be required in younger sections. Care should be taken to avoid burns.
- This activity uses milk and in particular isolates milk protein, which some individuals may be intolerant or allergic too. Unless told otherwise, you should never eat science.

Variations

- Smaller or larger quantities of plastic can be made depending on the amounts of each ingredient that you use. Try making different size batches and trying to build different things. You could even have a competition to see who can build the strongest miniature bridge from milk plastic.
- To build a program around dairy, you could also use the Discover Dairy challenge cards. You may notice some similarities in the science between this and the making cheese challenge card.