
SCHOOLS
Advancing Science & Engineering through Laboratory Learning

Milky Magic

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Introduction

From: Scientific American
Have you ever heard that plastic can be made out of milk? If this sounds far-fetched, you may be surprised to learn that from the early 1900s until about 1945, milk was commonly used to make many different plastic ornaments. This included buttons, decorative buckles, beads and other jewelry, fountain pens, the backings for hand-held mirrors, and fancy comb and brush sets. Milk plastic (usually called casein plastic) was even used to make jewellery for Queen Mary of England! In this activity, you will make your own casein plastic out of hot milk and vinegar.

Milky Magic – Part 1

Aim

Work in groups and use the materials provided on your bench. Follow the procedure to make and investigate casein plastic.

Materials

You will be given:

- Warm Milk
- White Vinegar
- Heating and measuring equipment

Procedure

- Fill up three beakers with 1 cup of milk, and heat it up until it's steaming hot, but **not boiling**
- Measure out and add 2, 4 and 8 teaspoons of vinegar to different containers. Stir the mixtures slowly with a spoon. Record any observations.
- Filter out curds (casein) and dry
- Knead the casein curds together

Observations

What did you observe?
Make as many OBSERVATIONS as you can and record them below.
When you can make no more observations, write ONE of your observations down.
Choose one that is not already listed.

Analysis

1. What amount of vinegar gave you the best results? (Amount of substance, consistency)

2. **Describe** the substance formed.

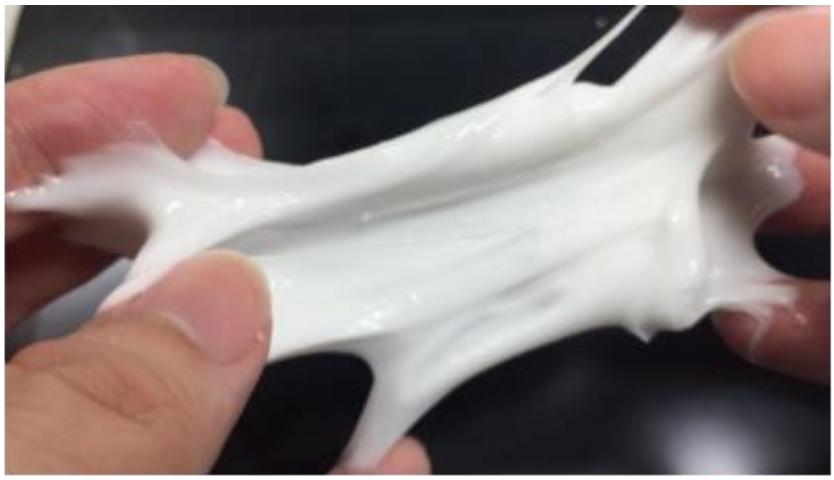
    a. Can you classify it (solid, liquid, in-between)?

    b. What are its physical properties?

    c. Can you think of any uses for it?

Part 2: Make Your Own Milky Magic

Design an experimental question to further investigate casein plastic.



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Aim

Having played a bit with casein plastic, think about an interesting question or investigation to conduct with the materials provided.

Play, Transform, Investigate and Experiment!

Materials

- Salt & Sugar
- Bicarbonate of Soda
- Borax
- Food Colouring
- Various milks (low fat, skim, soy, rice, coconut…)
- Measurement equipment and glassware
- Heating equipment

Planning your Experiment

Before rushing to the materials, formulate a testable hypothesis and plan how to conduct the experiment. What materials will you need, and what procedure will you use?

Aim & Hypothesis

Predictions

Plan

Discuss in your group how you will do your investigation and carry out the procedures.
Consider fixed and free variables, control trials, practicality and time constraints.

Experiment

Conduct the investigation and record your findings. Modify your procedure if needed! Clean up any spills!
Write what you did, any obstacles you encountered here.

Results

What did you observe? Which variables did you control, which did you test, and what were the outcomes?
Tabulate your findings if you need.

Discussion

Communicate your findings to the class and discuss the science behind them.
How would you improve your investigation?
What other observations could you make about the casein substance(s), using perhaps some materials that we do not have here?

Conclusion

Did your observations support your hypothesis?
What conclusions have you reached about the substances and ingredients you've been experimenting with?