Making Milk into Plastic

A Science Research Project presented to

SARSEF Regional Fair 2026

Energy and Change Category

Abstract

This science investigation explored how milk can be changed into plastic. The experiment used milk and vinegar to create a plastic-like material called casein plastic. The purpose of this project was to see if mixing milk and vinegar could produce a solid plastic material that could be shaped into toys. The results showed that milk plastic was successfully made and molded into four toys. This experiment demonstrates how chemistry can be used to create materials similar to plastic.

Introduction

Plastic is used in many everyday items, but it takes a very long time to decompose. Scientists are interested in finding alternative materials that are safer for the environment. The question for this investigation was: *How can milk be changed into plastic?* This experiment tested whether adding vinegar to heated milk could create a plastic-like substance.

Background Research

Milk contains a protein called casein. When milk is heated and acid is added, the casein molecules unfold and stick together to form a solid material. This material can be molded and shaped, making it similar to plastic. According to Science Buddies (n.d.), this type of plastic is biodegradable and breaks down faster than petroleum-based plastics, which can take up to 200 years to decompose.

Variables

- **Independent Variable:** Adding vinegar to milk
- **Dependent Variable:** Amount of plastic produced
- **Constants:** Type of milk, amount of vinegar, temperature, and materials used

Materials

- 1 cup of milk
- White vinegar
- Microwave
- Food coloring
- Thermometer
- Measuring cup
- Measuring spoon

Procedure

1. Heat the milk, but do not let it boil.
2. Add teaspoons of white vinegar to the warm milk.
3. Stir the mixture until white curds form.
4. Strain the curds using cloth or a strainer.
5. Press the curds to remove extra liquid.
6. Mold and shape the plastic into toys.
7. Let the plastic dry for 2–3 days.

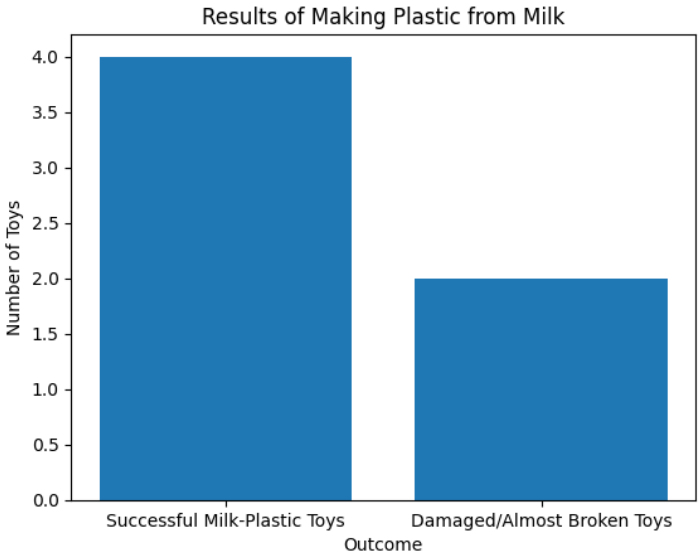
Results

Table 1

Milk Plastic Toy Results

Outcome	Number of Toys
Successful milk-plastic toys	4
Damaged or almost broken toys	2
Total toys made	**6**

Graph



The graph above shows that four milk-plastic toys were successfully made, while two toys were almost broken during cutting. This shows that the milk plastic was strong enough to form toys but still fragile.

Discussion

At first, the milk was spilling because the cup was full and not hot enough. After adjusting the process and waiting 2–3 days, the milk plastic became solid. Some pieces broke when cutters were used, but four toys were successfully made and colored. This shows that milk plastic can be shaped, but it needs careful handling.

Conclusion

The hypothesis was correct because mixing milk and vinegar created casein plastic. Milk plastic was successfully made and molded into toys. This experiment shows that milk can be used to make biodegradable plastic, which may help reduce plastic waste in the environment.

References

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