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BASF
We create chemistry

POLYMERS

TURN MILK INTO PLASTIC

Casein plastics, made from the protein of cows' milk, were introduced in the early 20th century. Casein was commonly used to make many types of plastic ornaments, such as buckles, knitting pins, and beads. Casein plastic was especially important for the button trade, as the material easily takes on dye, allowing for colored buttons to easily be made from pale colored stock.

In this experiment, you will make a simple casein plastic that you can dye and form into a shape.

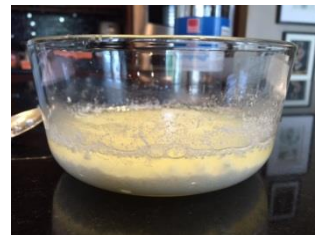
WHAT YOU WILL NEED:

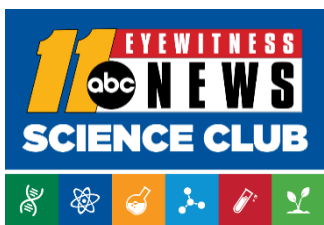
- Hot milk (1 cup)
- Mug or other heat resistant cup (a clear cup will allow better viewing of the chemical reaction)
- 4t (teaspoons) of vinegar
- Paper towels (4-8)
- Spoon
- Permission!



INSTRUCTIONS:

1. Measure 1 cup of hot milk.
2. Add the hot milk to your mug with vinegar.
3. Use the spoon to slowly mix the milk and vinegar for a few seconds. *What happens as the two fluids mix together?*
4. The small white clumps that form are called curds. *What do you think the curds are made of? Why does this reaction occur?*
5. Stack six sheets of paper towel on your counter or a cookie sheet. You'll need a surface that's safe to get damp.
6. After the milk has cooled, use your spoon to scoop out clumps of the curd. To minimize the liquid transferred to the paper towel, tilt and strain the spoon against the side of the mug.
7. Pile as much of the curd as you can onto the paper towel.
8. Fold the corners of your paper towel over your curd and press to absorb any additional liquid from the curds.
9. If the curds are still wet, use additional pieces of paper towel to absorb the extra liquid.





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INSTRUCTIONS CONTINUED:

9. Remove the added paper towel and push the curds together to start working them into a small ball. This is casein plastic!
10. You can color and shape your plastic. Knead it well before shaping to minimize cracking.
11. Leave your casein plastic to dry for 48 hours.
12. You can paint or color the material once it dries.

Some further exploration you can try:

- Discover how the temperature of the milk impacts how much casein plastic you can produce.
- Modify the quantities of vinegar to see what impact it has on the yield of casein plastic you produce.
- Vinegar is an acid that reacts with the milk. Try this experiment with other acids such as lemon juice, soda pop and tomato juice. Do some acids work better than others?
- Research online to discover what plastics are made from today.

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CASEIN PLASTIC!

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