

Making Glue

Introduction

White glue is often made from the protein in milk called *casein*, which is also used in some paints and to make a type of plastic-like button. The casein is separated from milk by the processes of *coagulation* and *precipitation*. At the factory, the casein is dried and ground up before it is made into glue.

In this lab, you will make glue using milk. Like any protein, the casein in milk is sensitive to changes in acidity and heat. Casein is produced in this experiment by adding both acid (vinegar) and gentle heat. After neutralization, the glue is safe to use just like any store-bought glue!

Materials

baking soda
filter paper

skim milk
vinegar

Equipment

beakers (2), 250-mL
funnel
graduated cylinder, 100-mL

hotplate
small spoon
stirring rod



Safety Considerations

- Although you will not have to wear safety goggles, some household chemicals are irritating to the eyes and skin.
- Sometimes chemicals from previous labs still remain in glassware and on other lab equipment; wash all lab equipment before and after performing this lab.
- Wash your hands thoroughly after completing this lab.

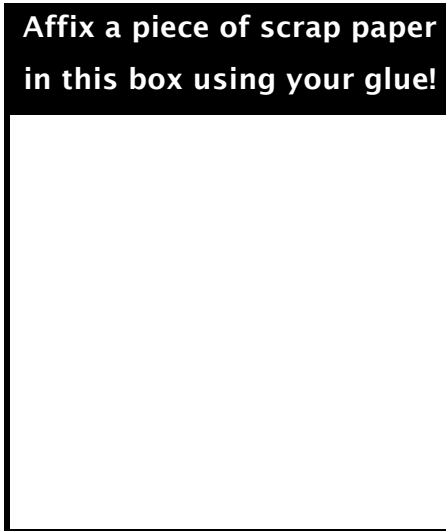
Procedure

1. Place about 125 mL of skim milk in a 250-mL beaker.
2. Add 25 mL of vinegar to the skim milk
3. On the hotplate, gently heat the milk and stir it constantly until small lumps, or curds, begin to form.
4. Remove the beaker from the heat and continue to stir until no more lumps form.
5. Allow the lumps to settle to the bottom of the beaker.
6. Filter the curds from the liquid by using filter paper and a funnel.
7. Gently press the filter paper around the curds to squeeze out the excess liquid through the filter paper.
8. Return the solid material to the empty beaker.
9. Add about 30 mL of water to the solid and stir.
10. Stir in a small scoop of baking soda to neutralize any acid left over from the vinegar. Watch for bubbles of gas to appear. Add a little more baking soda and stir until no more bubbles appear.
11. The substance in the beaker is glue! Test the adhesive properties of your product by gluing a small piece of scrap paper in the Data Table.

Clean-up

1. Dispose of any extra glue in the trash, NOT THE SINK.
2. Clean all used lab equipment with soap, water and a test tube brush.
3. Return all equipment to its proper location.
4. Wipe down your lab area and wash your hands before leaving the lab.

Data Table



Questions

1. What is the purpose of using vinegar in making glue? What is the purpose of the heat?

2. How is this lab similar to the Making Cheese lab? How is it different?

3. Why do you need to use baking soda when making glue?

4. Think about the molecular structure of proteins, which have a tangled, spiral shape. How do you think this shape is useful in a product like glue?

5. List one way you could change this lab and describe how your results might be different.

