



ZOOM Glue



What You Need

- ½ cup skim milk
- 2 tablespoons vinegar
- 2 large paper cups
- 5 paper towels
- rubber band
- plastic spoon
- 1 teaspoon baking soda
- 3 tablespoons water



Engineering Scoop

When you mix milk and vinegar together, the vinegar makes the **protein** in the milk stick together to form small white lumps. These are called **curds**. When you add **baking soda**, it **reacts** with the small amount of vinegar left in the curds. Add a little **water** and, voilà—you've got sticky **glue**! When you **add** glue between two pieces of paper, the glue **seeps** into tiny **cracks** in the paper. When the glue **hardens**, it holds the paper together. Engineers have designed glues to **hold together** things like envelopes, sneakers, and even airplanes! What can you **stick** together with your glue?

1 Put the vinegar into the cup holding the skim milk. **Stir** for about 30 seconds. The lumps that form are called **curds**, and the liquid is called **whey**.

2 Make a strainer to separate the curds from the whey. **Put** a folded paper towel over one of the large paper cups. **Push** down in the center so it forms a **bowl** shape. Put a rubber band around the top of the cup to **hold** the paper towel.

3 Pour the curds and whey into the cup with the paper towel.

4 Wait about 5 minutes for all the whey to drip through the paper towel.

5 Use a spoon to carefully **scoop** out the curds and **put** them on a clean paper towel.

6 Put another paper towel on top of the curds and **gently press** down. **Soak up** the remaining liquid until the curds feel **firm**, not squishy.

7 Put the curds in a clean paper cup. **Add** about 2 teaspoons of water to the curds and **stir**.

8 Add the baking soda and stir. Do you see any **bubbles**? This is the carbon dioxide **gas** that's made when baking soda and vinegar **react**.

9 Add small amounts of water until your mixture looks like glue.



Redesign It!

Change your glue recipe. What happens if you **use whole milk** instead of skim milk? What happens if you **leave out the baking soda**? You can also **invent your own glue** out of different ingredients. Choose **one thing** to test and **send** your results to ZOOM.

Sent in by Ashley V. of Norwood, MA



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