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Science in the Kitchen - More Magic with Milk

By Jonathan Winter

What do milk and glue have in common? One of the oldest kinds of glue is actually made from milk, using a recipe similar to this one. This is actually a glue you can eat!

1) Gather these supplies:

Skim milk (2 cups)

Saucepan and stirring spoon

Strainer

Baking soda

Vinegar

Water

Measuring cup, measuring

spoons Large bowl and stovetop

2) Start your Experiment:

Pour two cups of skim milk into a bowl. Add 6 tablespoons of vinegar. Heat slowly while stirring. When the solution starts to curdle (solids start to form) remove from heat and keep stirring until the curdling stops. Strain the mixture, saving the curds (the solid part). Put the curds in the bowl and add 1/2 cup water and 1 tablespoon of baking soda. Stir well.

3) What happened?

When you added the vinegar to the milk and heated it, the vinegar clumped the tiny solids in the milk together. These solids are the protein in the milk called casein. You may have eaten casein before-it is cottage cheese in its most basic form. But little clumps of solids don't make a very good glue. That's why you added the baking soda. The baking soda breaks down the casein just enough for it to flow a little more easily (with the help of the water).

Try gluing some paper together to test the strength of your glue. Keep your glue in the refrigerator. It will last up to two weeks. When it starts to smell like sour milk, it's time to throw it out. As long as it smells o.k., you can eat it. It is even good for you! How does it taste?

4) Experiment Extension

Not only can milk be used to make glue, you can follow this recipe to make "plastic." To make milk plastic, just follow the recipe above, but skip the baking soda and water step. Instead, mold the blobs of casein into shapes of your choice. Allow your creation to dry and harden completely. Can you make a spoon? Can you use it to eat some ice cream?

Real plastic is made from oil. Plastic doesn't ever rot and is causing a big pollution problem in the world. The "plastic" you made is natural, and will break down over time into natural ingredients again. It is biodegradable. You can check how long it takes your "plastic" to break down by burying your creation in a carefully marked spot and digging it up again in a few weeks. Is anything left? How great it would be if all of the world's plastic would break down naturally!

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