

What you need:

- 375mL (1½ cups) milk
- 30mL (2 tbsp) white vinegar
- Saucepan or small pot
- Tablespoon
- Plate
- Bowl of water
- Adult helper
- Measuring cup



What you do:

Step 1: Have an adult help you warm the milk in a saucepan until it just starts to boil.

Step 2: Slowly add the 2 tablespoons of vinegar to the boiling milk a little at a time. Your adult helper should keep stirring!

Step 3: You should see the mixture get “rubbery” in a few seconds.

Step 4: Spoon the rubbery mixture into a bowl of cold water. This will allow it time to cool, and it will clean the material before you handle it.

Step 5: Once the mixture has cooled down, remove it from the bowl of water and place it on a plate. Have fun molding your Moo Material!

Clean-up: Flush the liquid part of the mix down the drain with lots of water. Throw the rubbery part in the garbage when you have finished playing with it.



What's going on:

Milk contains very small molecules of fats, proteins (mostly casein), carbohydrates (mostly lactose) and minerals. We call milk a colloid mixture because all of these small particles are evenly distributed and suspended in water, and do not settle with time. Vinegar is an acid called acetic acid. When vinegar is added to warmed milk, the pH of the milk falls and causes a chemical reaction that makes the casein proteins clump together instead of moving freely in the liquid. When the protein molecules stick together, they form a “plastic-like” material.

Now try this:

Try using different kinds of milk such as soy milk or skim milk. Do you get the same Moo Material? What if you substituted vinegar for another acid, such as lemon juice? Which version(s) makes the most moldable moo material?!