

Science: Making Plastic Toys From Milk!

Ages: 7 - 11

Hello everyone. This is Bill from the Okanagan Regional Library System. Welcome to the fun and inventive world of making your own STEAM projects in your own home. Each week, I will share a fun and interesting project that you can make using materials commonly found in your own home

Even though we can't be together right now, we can still learn how to make exciting projects each week!

This week's project is Making Plastic Toys from Milk.

Plastic From Milk

Known as casein plastic, the process of making plastic from milk has been used for over 100 years. It is also the way that plastic was made until synthetic plastics were introduced in 1945. Even Kings and Queens wore jewelry made from plastic for many years.

Using this simple process, you can make toys, beads, jewelry and more. This is a budget friendly experiment, with great results that will have your children excited about science!

Materials Needed:

- A stove top or microwave to warm the milk
- Milk (2% or lower fat content is best)
- White Vinegar
- Bowl
- Spoon
- Fine Meshed Strainer (or create your own using cheese cloth)
- Paper Towels
- Molds (like cookie cutters) or other tools for shaping
- Food Colouring (optional)
- Kraft paint (optional)



Time: 30 to 90 minutes for the experiment; 2 days for drying; extra time for painting once dry.

Steps:

1. Measure 2 cups of milk into a sauce pan.
2. Heat the milk until you see it just starting to steam.
3. You will notice that it immediately begins to curdle. You are making curds and whey.

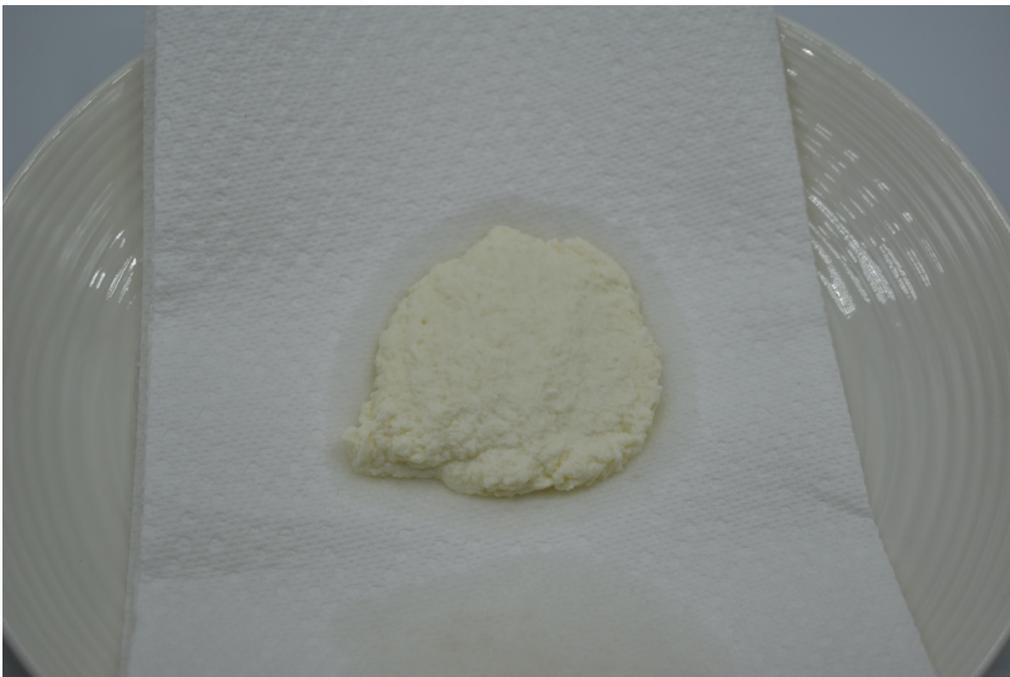


4. Stir gently for approximately one minute for the full reaction to finish and all the curds to form. Be gentle – don't stir aggressively.
5. Strain off the whey using a fine mesh strainer or cheese cloth.

6. Let drip for a few minutes until most of the liquid has drained off.



7. Remove the curds from the strainer and place them on a few layers of paper towel.



8. Carefully pat and squish to remove more liquid. Note: You may need to replace the paper towel and repeat a few times. The goal is to remove as much liquid as possible.
9. You will notice that it is kind of crumbly and squishy, but you can smooch and shape it.
10. You can put the curds into the molds, or you can shape them by hand. You could roll them to create beads, then use a skewer to put a hole through each bead before setting them aside to dry.



11. The drying time takes approximately 2 days. If using a mold, you can remove the object from the mold after 24 hours to help speed up the drying process.
12. Once dry, clean up the edges a bit if using your fingers, a piece of sandpaper or other tools. It will be hard plastic now, so it might take a little extra work.



13. You can paint your final product using either acrylic paint or marker.

How Long Will Milk Plastic Last?

1. Objects made out of milk plastic can easily last 2 years or longer.
2. When coated with a acrylic clear coat, the **plastic** is fully waterproof and UV stable.

STEAM

This activity includes everything you need for a comprehensive STEAM project.

Science: Milk contains many molecules of a protein called casein. When milk is heated and combined with an acid, such as vinegar, the casein molecules unfold and reorganize into a long chain. ... The polymer can be scooped up and molded, which is why plastic made from milk is called casein plastic.

Technology: Question: How does the temperature of the milk affect how much casein plastic you can produce?

Engineering and Art: Creating your own objects out of milk plastic.

Math: Measuring recipe amounts.