



Challenger's Morning Science Segment:

January 15, 2018

Topic: Plastic & Polymers

Build: Milk Sculptures

Credit:

<https://www.scientificamerican.com/article/bring-science-home-milk-plastic/>

Materials Needed: milk [skim preferred] / measuring cup & spoons / microwave / white vinegar / strainer / plate & bowl & spoon

Build your milk sculptures: Measure out 1 cup of milk and place into a microwave safe bowl. Heat the milk in the microwave for 5 minutes at 50% power. Afterwards, add 4 teaspoons white vinegar to the heated milk. Using a spoon, stir milk/vinegar mixtures for a few seconds. After stirring, pour milk/vinegar mixtures thru a strainer to separate the curds [solid parts] and the whey [liquid part]. The whey can be discarded so only the curds are left for the experiment. Once the curds have cooled to the touch, start to knead the curds together in a ball, similar to the action of kneading bread dough. Next the curds, also known at this point as casein plastic, can be shape to anything you wish to make...either by hand or even using a mold/cookie-cutter. Leave shaped casein plastic out to dry on plate for up to 48 hours to harden.

The science: [<https://www.scientificamerican.com/article/bring-science-home-milk-plastic/>]

Adding vinegar, an acid, changes the milk's acidity. This action makes "the casein molecules unfold and reorganize in a long chain." Milk plastic, also known as casein plastic, is created just by changing the pH level of milk. "Milk contains many molecules of a protein called casein. Each casein molecule is monomer and chain of casein monomers is a polymer. The polymer can be scooped up and molded." Milk plastic was even commonly used in the early 1900s!

Upcoming at the Challenger Learning Center of Maine: Challenger's February Vacation Camp is open for registration. Camp will run Feb 19-23 and is open for grades K-5. Don't miss out on this awesome science camp! Sign up now to secure a spot. FMI- www.astronaut.org