

Strand: 8.1	Standard: 8.1.4	Episode 2	Big Idea: How are natural resources used to make useful synthetic materials?
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Title: Phenomenon: Homemade plastic	Time: 45 minutes	CCCs: <u>Structure and Function</u>	Practices: Ask Questions
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Episode Snapshot:

Students get the opportunity to see the phenomenon of a natural substance becoming a synthetic one (since most have not observed this in their experience) they will ask **questions** about where actual plastic comes from and how it is made and what makes something synthetic.

Gathering:

Students will create milk plastic (casein) though you want them to identify that it is plastic like on their own without telling them it is plastic till the end.

Preparation

- Heat one cup of milk per group in a pan on a hot plate until it is steaming hot. Alternatively, you can microwave the milk in a microwaveable container by warming it at 50 percent power for 30 seconds -1 minute. It should be about the same temperature as milk you would use to make hot cocoa; heat longer if needed.

Procedure

- Have each group get 250 ml of the hot milk in a beaker.
- Add 60 ml of white vinegar to the milk
- Mix the mug slowly with a spoon. Write down observations of what happened to the substances.
- Stack four layers of paper towels on a hard surface that will not be damaged if it gets damp.
- Use a spoon to scoop out the curds. You can do this by tilting the spoon against the inside of the mug to let excess liquid drain out while retaining the curds in the spoon. Collect as many curds as you can in this way and put them on top of the paper towel stack.
- Fold the edges of the paper towel stack over the curds and press down on them to absorb excess liquid. Use extra paper towels if needed to soak up the remaining moisture.
- Knead all of the curds together into a ball, as if it were dough. What you have in your hands is casein plastic.
- Optional: Use the casein plastic to make something using a cookie cutter or a silicon mold
- Leave it to dry on paper towels for at least 48 hours. You do not need to wait the full 48 hours to finish the rest of asking questions for the phenomenon *It would be useful to have a few pieces of the plastic already hardened to show the students so that you don't have to wait for 48 hours to finish this phenomenon activity*

Reasoning

Have students write 3 observations about what happened and 3 observations about the final product. Have them explain the best they can what they think they have created and why it happened (don't use the term synthetic or natural yet see if they come up with it). After trying to explain it have them ask 2 questions that would help them better understand what happened. Have the students brainstorm what do they think this product could be used for?

Communicating

Have students discuss in groups how the properties (structure) of the product would affect the function of what it could be used for.

Have students discuss what other substances they are familiar with that have similar properties

Optional: Share with the students the following information after they decide how it could be used and what it is like.

This is actually a type of plastic. This plastic was used in the early 1900s until about 1945, milk was commonly used to make many different plastic ornaments. This included buttons, decorative buckles, beads and other jewelry, fountain pens, the backings for hand-held mirrors, and fancy comb and brush sets. Queen Mary even ordered a few pieces of jewelry made from this newly developed substance. Though to harden the substance it must be dipped in formaldehyde for a more permanent plastic.

Assessment: Were the students able to identify that this is an unnatural substance coming from a natural substance? This will be identified through discussion or by having the students complete an exit ticket explaining this.	Materials, resources, handouts, etc: - graduated cylinders - Milk - A way of warming the milk (hot plate, microwave etc) - Beaker or other heat-resistant cup - White vinegar - Paper towels - Spoon - Cookie-cutters or a silicon mold - Pre dried shapes of the plastic - For teacher reference Milk plastic video
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