Turn Milk Into Plastic!

Name: _____

Date: _____

Student worksheet

Directions: Follow these steps to conduct your experiments. You will work in teams of 2–4 students. Divide and share tasks throughout the experiment.

1. Experiment

a. Your teacher will provide each group with one cup of hot milk. You should also have a cup that is filled with some white vinegar. Once you have received the milk, carefully add it to the cup with vinegar.

b. Mix the hot milk and vinegar slowly with a spoon for a few seconds.

   Describe what happens to the milk when it is mixed with vinegar:

c. Stack four layers of paper towels on a surface that is safe to get damp.

d. Once the milk and vinegar mixture has cooled a bit, use a spoon to scoop out the solid curds. This works best if you tilt 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 the curds on top of the paper towel stack.

   Describe what the curd looks like:

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Directions: Follow the steps below to complete your experiment and reflect on the process.

e. Fold the edges of the paper towel stack over the curds and press down on them to absorb excess liquid. You can use two more paper towels to press down on top of the curds to soak up the rest of the extra liquid.

f. Knead all of the curd together in a ball of dough.

   How does the curd feel? Does its consistency change over time while kneading?

g. Now you can mold and shape the casein polymer into a form of your choice. To mold the plastic, you must knead the dough well before shaping it. Once you are satisfied with your product, leave it to dry on paper towels for at least 48 hours. After that time, the milk plastic will be hard.

2. Reflect

a. How can milk be turned into a plastic? In your own words, describe briefly what makes milk transform into a polymer.

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Directions: Answer the questions below to reflect on your experiment and results.

b. Describe some properties of your plastic product. (Consider questions such as "How does it look?" "How does it feel?" "Does it break easily?" or "Is it water resistant?")

c. Considering your answer in question 2.b, how did the properties of milk—your starting material for the plastic production—change during the chemical reaction?

d. Think about how many things that we use every day are made out of plastic. Do you think having so much plastic around is good or bad? List some arguments below why you think producing tons of plastic is good or bad for us.