Milk Magic

Turning Milk into Plastic

Category: Biochemistry

Grade: 4

Purpose:

- I chose this project because I know how real plastic is hurting our world.
- Pollution is growing and trash is ending up in oceans and parks.
- I want people to use this plastic because it decomposes on its own and keeps the planet clean.

Hypothesis:

- My hypothesis is that I can make plastic out of milk by adding vinegar to it and the more vinegar that I add the harder the plastic will be.

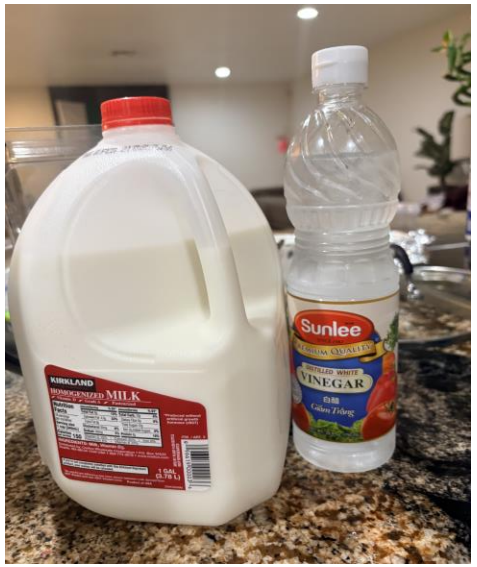
Introduction:

- We use plastic every day, for example what about your breakfast cup or bowl, even your water bottle.
- I know this seems impossible but what if I told you that plastic can be made from milk.
- Today, I will show you how to make your own **casein plastic.**
- Believe it or not, in the early 1900s to 1945 people used casein plastic.

Materials

- Mugs/ heat resistant cups
- Pen
- Teaspoon
- White vinegar
- Milk
- Microwavable measuring cups
- Spoons
- Cotton cloth
- Rubber bands
- Clear cups

Experiment set up:



Vinegar cups

Poured mixture of milk and vinegar on cotton cloth covered cups

Curd collected on cotton cloth

Plastic formed

Methods

- First label your cups as #1,2,4,8,16,32.
- Then pour 1 teaspoon of vinegar in cup #1.
- Pour 2 cups of vinegar in cup #2.
- 4 teaspoons in cup #4 and so on.
- Then pour 8 ounces of boiling milk in each cup.
- Get 6 cups and put cotton on them and secure the cotton with rubber bands.
- Then pour the liquid from each cup into the new cups, the curds on top of the cotton are your plastic.

Data:

Number of vinegar teaspoons	Forms curd	Level of hardness	Time duration to form plastic
1	yes	-	96 hours
2	yes	-	96 hours
4	yes	+	48 hours
8	yes	+++	24 hours
16	yes	++++	18 hours
32	yes	+++++	18 hours

Results:

- When I poured the mixture of vinegar and boiled milk into the cotton cups, I noticed curds forming on the top of the cotton pieces.
- The more the vinegar the harder the plastic was.
- Curd formed on the top of cups #1 and 2 was soft
- Curd formed on the top of cups #4 was medium
- Curd formed on the top of cups #8, 16 and 32 was the hardest in consistency

Bonus:

- We also tried eggs white instead of milk
- I mixed egg white from 3 eggs with 8 teaspoons of vinegar and a white curd formed on top of cotton cloth.
- Eggs have albumin.
- Milk has casein.
- They both have protein and that is what led me to trying eggs.
- Plastic made of eggs was the hardest.

Conclusion

- So now let me tell you what I learned. You can make plastic out of milk and vinegar.
- Milk protein and vinegar form a polymer which makes plastic, and the more the vinegar the harder the plastic is.
- You can also make plastic by adding vinegar to egg whites.