



Milk It

Look around you right now. Can you spot any objects made of plastic?

Plastic comes in all shapes and sizes, from bags to water bottles to toys. Though these plastic objects might look and feel very different from each other, they are all plastic. Plastic is made of long chains of molecules (tiny building blocks) that are repeated over and over. These molecules are called *monomers* (MAH-nuh-mers).

When monomers link up in a chain, they create a *polymer* (PA-luh-mer). Some polymers are made from several types of monomers linking up in a chain. Other polymers are a chain of just one type of monomer.

God made polymers when he created everything during creation week about 6,000 years ago. And he created humans with the knowledge to work with these polymers to make useful objects.

We've learned how to make plastic from plants, oil, coal, and even milk! Milk contains many molecules of the monomer called *casein* (KAY-seen). When you heat milk and add an acid (like vinegar or lemon juice), a chemical reaction occurs. The acid cooks the milk and causes the casein monomers in the milk to unfold, reorganize, and link up into a chain, creating a polymer. This causes the liquids to become a solid called casein plastic.

Try making your own casein plastic and mold it into fun shapes.



I'm **Mr P.**, the host of *Unlocking Science* on Answers TV. Let's have some fun as we investigate God's amazing creation.



Let's do it!

What You'll Need

- 1 cup milk
- 4 tsp. vinegar
- Microwave-safe bowl
- Spoon
- Strainer
- Paper towels



What to Do

1. Microwave the milk in a microwave-safe bowl until the milk is steaming.
2. Carefully remove the bowl from the microwave.
3. Add vinegar to the warm milk. Gently stir the milk and vinegar with a spoon for about one minute.
4. Once the mixture has cooled, pour it into a strainer to remove any extra liquid. Make sure you keep the clumps that formed.
5. Mash together the solid clumps.
6. Pat the large clump dry with a paper towel.
7. Roll the sticky substance into a ball or use a cookie cutter or candy molds to make shapes.
8. Leave your milk plastic to dry for a day or two. Once it hardens, you can paint or decorate it.

What's the Word?

Monomer comes from two Greek words. *Mono* means "one" and *meros* means "parts." Together, you get the meaning of *monomer*: "one part."

Polymer also comes from two Greek words. *Poly* means "many" and *meros* means "parts." So *polymer* means "many parts."

Fun Facts

- » Casein plastic has been around for over 100 years.
- » Some buttons, beads, mirrors, and hairbrushes were once made of casein plastic.
- » Casein plastic is biodegradable, which means it can be decomposed (broken down) by bacteria.

