

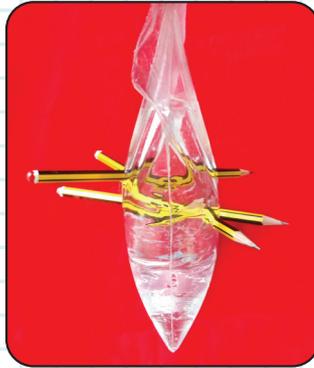
## Teacher-led activity

## LEAK-PROOF BAG



### You will need:

- Plastic freezer bag
- Sharp pencils
- Water
- Bowl



### What you do:

1. Half fill a freezer bag with water.
2. Hold the bag over a sink or bowl.
3. Push a sharpened pencil through one side and out the other side.
4. Repeat with more pencils.

### You should find:

You would probably expect water to spray out from the bag, but instead you should find that almost no water leaks out whilst the pencil is in place. This is because the sharp tip of the pencil has pushed between the polymers of the plastic bag, rather than breaking them. The stretchy polymers form a tight seal around the pencil, preventing the water from leaking out.

## Pupil activity

## MAKE YOUR OWN PLASTIC

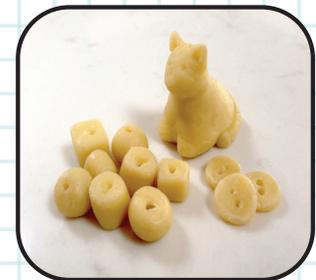
### What you do:

1. Heat up the milk until it's hot, but not boiling.
2. Add the vinegar to the milk and stir for about a minute. You will see lumps forming.
3. Pour the liquid through the sieve into a sink.
4. Rinse the lumpy blobs left behind with cold water.
5. Squeeze out as much moisture as you can and then press the lumps together to make one ball. It helps if you dry the mixture as much as possible with paper towels. Once it is dry enough, you can mould it into whatever shape you want, before leaving it to dry completely.



### You will need:

- One cup of milk
- 4 teaspoons of white wine vinegar
- A sieve
- Paper towels



### You should find:

After a few days, the soft material will harden and become solid. What you have made is casein plastic, which is formed from the casein protein in the milk. Adding an acid, such as vinegar, to the milk makes the casein molecules unfold and join together into long chains or polymers. These chains stick together to form the lumps in the milk, which then turn solid as they dry out.