Activity - coagulation of milk

What you'll need:
• a glass of milk (the higher the fat content, the better) • 2-3 tablespoons of vinegar or lemon juice

What to do:
Easy! Simply add the vinegar/lemon juice to the glass of milk

What you may notice:
The milk will turn into an unpleasant mixture of clear liquid and white chunks! If you'd like, you can filter out the solids using a coffee filter (or a similar tool).

The science behind it all:

Milk is mainly made up of water, fat globules and casein micelles. Casein is a type of protein found in milk which combines with calcium phosphate and a few other minor components to form little particles known as casein micelles.

Casein micelles are hydrophobic (literal translation = water fearing) and are repelled by water. The outside of the micelle is negatively charged and this property allows them to float freely in milk. Acid (like vinegar and lemon juice), on the other hand, is positively charged and, when it is added to milk, these positively charged hydrogen ions neutralise the negatively charged micelles. The micelles begin to stick together, forming a huge sticky network which tends to catch the fat globules floating nearby and form those white clumpy bits in your milk (these are known as curds). This process is known as coagulation or curdling.

Beyond the science:

If you were brave enough to filter the curds from your chunky milk, you are actually on your way to making cheese. Cheese is usually made by adding an enzyme called rennet to milk to curdle it, allowing for removal of the hard bits. In soft cheese or cottage cheese manufacturing, the milk is acidified by the addition of lactic acid or lactic acid-producing microorganisms.

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