



Activity: Wobbly NanoJelly Experiment

Ages: 6 and up – Adult supervision required.

Hot water is used to dissolve jelly – hot water can be very dangerous so ensure an adult does this part

Watch Our NanoJelly video here:

<https://youtu.be/TNUA5rw7pjpg>

How to make your own



You will need:

- 1 Packet of jelly cubes or powder (NOTE: Vegetarian jelly will not work for this experiment)
- Fresh Pineapple (can be bought ready-prepared from a supermarket)
- Tinned Pineapple
- Kettle (to heat water)
- Jug
- Spoon
- 3 cups

Instructions:

1. Take the jelly cubes or powder out of the packet in place into your jug.
2. Add the boiling water to your jug. The amount of water you need will depend on the type of jelly you have used – check the packet for instructions. We used 500 mL boiling water to dissolve our jelly.
NOTE: Boiling water is very dangerous! Get an adult help you with this step.
3. Stir the water and jelly mixture gently until the jelly has completely dissolved.

4. Take 3 cups. In the first cup, place a few pieces of fresh pineapple. In the second cup, place a few pieces of tinned pineapple. The third cup will remain empty for now.

Use a marker pen or a sticker to write on each cup so you don't forget which is which.

Write "FRESH" on the cup containing the fresh pineapple, write "TINNED" on the cup containing the tinned pineapple and write "CONTROL" on the cup with no pineapple.

5. Carefully pour an equal amount of the dissolved jelly mixture into each of the cups.
6. Put the three cup in the fridge for at least 4 hours.
7. After 4 hours, check your jelly! Which jelly has set? Which jelly is still a liquid?

The Science:

To understand why jelly is wobbly, we have to take a look at jelly on a nano scale! Jelly contains gelatine which is made from the protein **collagen**. These collagen strands are the nano-sized building blocks which give jelly its unique wobbly properties.

When the gelatine is heated and mixed with water the bonds are broken and the protein fibers unravel and come apart. These nano-sized collagen fibers are not connected, and the mixture is a liquid.

As the jelly cools the collagen fibers coil up again and become tangled. The water that we have added becomes trapped between the collagen strands. When this happens the mixture changes from a liquid into a wobbly jelly. This is why we put jelly in the fridge to set.

Why does fresh pineapple stop jelly from setting?

Certain fruits – pineapple, papaya and kiwi – contain enzymes which break down these protein molecules. This is like the way that enzymes in your stomach break down food. Pineapple contains **bromelain**. This enzyme breaks down the collagen strands into smaller parts. When the strands are smaller they cannot tangle up and the jelly does set.

Tinned pineapple does not contain bromelain. Before pineapple is tinned, it is heated to kill of any bacteria – this heating process also destroys the bromelain enzyme, That is why fresh pineapple will stop your jelly from setting, but adding tinned pineapple will not!

ReallySmallScience:

ReallySmallScience is a group of researchers from the Department of Chemical and Process Engineering at the University of Strathclyde in Glasgow. Our aim is to bring chemical engineering research to people of all ages through fun, hands-on science activities. At Strathclyde, researchers in Chemical and Process Engineering work on **nanoengineering** – science on a really small scale!

We develop new polymers including gels and adsorbents which can be used in water treatment, carbon capture and storage.

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