**Why does jelly wobble?**

Jelly is the ultimate sweet treat for kids, jiggling on the plate as we thrust in our spoons. But the science going on in jelly is almost as fun as the tasty creation that’s become a household staple.

Jelly is a type of colloid known as a hydrogel – a network of solid chains dispersed through a liquid. In the case of jelly, these polymer chains are made from gelatin, a mix of different amino acids. Gelatin’s chains are created through the partial hydrolysis of collagen – the substance that keeps our skin firm and taut – and is usually obtained from animal hides and bones. Agar, a vegetarian-friendly alternative made from seaweed, is also available and often used in Asian cuisine.

Gelatin is an incredible material: it’s capable of absorbing up to 10 times its weight in water, is transparent, brittle, and only dissolves in polar solvents such as hot water. Gelatin is completely safe to eat, and it is tasteless, odourless and colourless. These properties mean it’s useful for any food that needs thickening, such as soups, dips and puddings, but also cosmetics (such as shampoos) and capsules for medicines. It’s even used for photographic films, and for dummy bodies used by crime scene investigators when testing the impact of weapons.

Jelly mix bought in the supermarket isn’t particularly wobbly. When hot water is added, the hydrogen bonds between the gelatin polymer chains are broken, allowing them to unfurl and stretch out, so the jelly can be poured into the required shape. When cooled, the polymer chains begin to coil up and bond again, forming cross-links to build a triple helix – a three-dimensional net. These chains can be so long they span the entire jelly, and create a thicket of amino acids that surround and traps the water molecules.

The main downside of gelatin is that, being made of protein, it can be digested by enzymes. This is why you should never put fresh pineapples or kiwi fruits in a jelly mix: they both contain the enzyme bromalain, which breaks down gelatin’s polymer chains into smaller pieces, preventing the water from being trapped and leaving the jelly a puddle of flavoured goo. (Tinned pineapples are fine, however: they are heated to kill any bacteria before they are added to the can, which denatures the bromalain enzymes and prevents them from doing their job.)

Once you’ve got your jelly set, physics comes into play. Jellies are elastic. The gelatin chains are flimsy and deform on impact, but the bonds between them prevent the chains from stretching out completely. This allows them to return to their original, relaxed state, and the jelly to go back to its former shape. Elasticity is an incredibly useful property, and is also the reason rubber bands snap back after being pulled: vulcanised rubber is made of long chains of cis-1,4-polyisoprene, linked together with sulfur bridges. It can stretch (within reason), but will return to how it was before.

There’s one more key ingredient in jelly’s wibbly-wobbliness: resonance. As most of jelly is just water, it picks up vibrations in the same way as if it were a liquid. These sensations are amplified, so that even a small tremor or jolt is enough to start a jelly wobbling. Thanks to the polymer net keeping things in place, the jelly will start to shake around on the plate as the kinetic energy passes through. Once again, this is an incredibly useful property, as it means similar materials can be used to dampen vibrations and protect structures or sensitive equipment from damage.

So why does jelly wobble? Because it’s picked up kinetic energy through a vibration, which has been amplified throughout its hydrogel structure and caused the polymer chains inside to deform. Once the source of energy is removed, the elastic polymer chains will return to their resting state, and the jelly will be still once more – and ready to eat.