



## Magic Milk

In the small intestine bile salts, released by the gall bladder, help us to break down fats in our food. We can demonstrate this process using some simple items found in the kitchen.

### You will need

- A plate (or similar flat, shallow tray)
- Milk
- Food colouring (various colours)
- A pipette or drinking straw
- Washing-up liquid

### Steps

1. Pour the milk into the plate or shallow tray, until it's just short of the brim. Allow it to settle for around 30 seconds.
2. Use the pipette/drinking straw to put a drop of each food colour at various locations in the pool of milk.

3. Squeeze a small drop of washing-up liquid onto the edge of the plate/tray, so that it slowly slides down into the milk.
4. When it does so, you should see something very interesting – the milk will start to swirl, and the drops of colour will mix, creating a kaleidoscope of colours...

### Follow-up

Milk consists of **globules** of fat, suspended in water-based fluid containing proteins and sugars – a complicated mixture known as an emulsion.

Each fat globule is surrounded by a membrane, made up of proteins and chemicals called **phospholipids**. This coating stops the globules from joining together into a single blob of fat.

Washing-up liquid – like bile salts – is classified as a **detergent**. When mixed with the milk, its molecules attach to water at one end and the fat molecules at the other.

This rearranges the fat globules, and gives rise to the swirling action seen in the milk and food colouring. Detergents also reduce surface tension in water, which may contribute to the overall effect.

Bile salts perform the same action in the gut – they rearrange or emulsify the fats in our food, increasing their surface area, thus helping **enzymes** to break them down.

You can also show this using vegetable oil mixed with water. Washing-up liquid will break up – or emulsify – the two layers of these liquids.