Milk and More

BIOCHEMISTRY WORKSHOP

Kaleidoscope Milk

In this activity you will learn about the composition of milk in a colourful way.

What you need

A saucer or shallow dish
Some milk
3 or 4 different coloured food colouring liquids
Some washing up liquid
A cotton bud or cocktail stick

What to do:

- Pour some milk into the saucer or dish so that it covers the base completely
- Add a few drops of one of the food colourings in a blob near the edge
- Add blobs of the other food colourings to different parts of the saucer so that you have 3 or 4 distinctive blobs of colour
- Dip one end of the cotton bud or cocktail stick in washing up liquid
- Dab the surface of the milk lightly with the soapy end of the cotton bud/cocktail stick
- Keep dabbing until nothing more happens

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What's going on?

Soap works by breaking up fat and oil globules that are not soluble in water into smaller droplets. These then disperse in water and can be washed away. Soap can do this because it is made up of molecules that have two very different ends – like a tail and a head. Their heads are hydrophilic, meaning they like water, whereas the tails are hydrophobic, meaning they don't like water. When these molecules are put into water, the tails try to get away from the water by sticking to the fat globules. Eventually the globule is completely surrounded by soap molecules and becomes suspended in the water. This structure is known as a micelle.

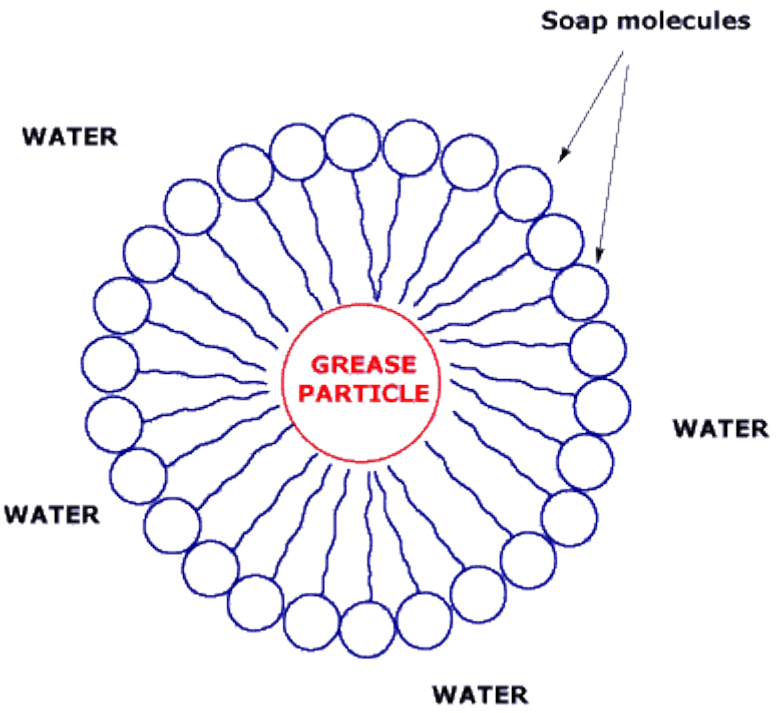

Illustration from https://www.quora.com/How-does-soap-work-as-a-cleaning-agent

Milk is mostly made up of water but also includes some fat. When the soap that's on the end of the cotton bud touches the surface of the milk, soap molecules immediately start attaching themselves to fat globules in the milk. They race around the milk looking for fat globules and break them up into smaller droplets. This creates a lot of movement in the milk and the food colouring allows us to see that movement going on. When all of the fat globules have been surrounded by soap molecules, the movement stops.

Extension Activity

Does the experiment work as well with different types of milk? Can you find any milk that the experiment won't work at all with? Can you explain any differences you have found?

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