

Emulsifiers

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To find out more about the project, and get more resources to help widen participation, visit our Outreach resources hub: rsc.li/3CJX7M3.

Learning objectives

By the end of this session, you will be able to:

- Explain how soap acts as an emulsifier in cleaning.
- Explain how emulsifiers are used to make hand creams.

Career links

Senior scientist

Find out more about chemistry careers, such as senior scientist in household goods Phillip. His job profile, available on **slide 4** and from rsc.li/3kfmiRF, explains how he leads a team of researchers to improve the quality and performance of household products such as soaps and shampoos.

Consumer products technician

Watch the video job profile on **slide 9**, also available from rsc.li/3HR7C31, to learn about careers such as Robert's. He is a consumer products technician and develops materials to improve the properties of household products such as washing-up liquids and soaps.

Demonstration: why does soap clean?

1. (a) Describe what happened when the vegetable oil was added to the coloured water.

- (b) Why did this happen?

2. (a) What happened when the washing-up liquid was added to the oil and water in the bottle?

- (b) Why did this happen?

3. What is an emulsion?

4. What is an emulsifier?

Activity 1: making hand cream

Equipment

- Water bath (shared)
- Stirrer
- 50 ml measuring cylinder
- 4 g petroleum jelly
- 4 g coconut oil
- Lecithin solution
- Sample vial
- Essential oils (shared)
- Two 250 ml beakers
- Spatula

Safety

Make sure that you wash your hands after the activity. Do not use any of the hand cream on your skin. Be aware of any allergies before carrying out the activities.

To do

1. Place 4 g of petroleum jelly and 4 g of coconut oil into a 250 ml beaker and warm in a hot water bath until they melt and turn to liquid.
2. Measure 40 ml of lecithin solution into a second beaker and place into the water bath.
3. When the oils have fully melted, remove both beakers from the water bath. Take care when removing the beakers from the water bath as they may be hot.
4. Slowly add the melted oils to the warm lecithin solution while constantly stirring.
5. Once all the oil has been added, a cream should start to form.
6. Add a drop or two of an essential oil with a scent of your choice.
7. Cool the mixture down in a cold-water bath.
8. Once cooled, use the spatula to scoop your hand cream into the sample vial.

To answer

- (a) Emulsifiers allow the fats (or oil) and water to mix. Which ingredient is the emulsifier in this recipe?
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Activity 2: analysing hand cream using a microscope

In this activity you will use a microscope to look at the sample of hand cream you made in greater detail. If you look at the hand cream with the naked eye, you will not be able to see the individual droplets of oil very clearly, but by using the microscope you should be able to see how the oil droplets are spread throughout the mixture.

Equipment

- Microscope
- Microscope slide
- Cover slip

To do

1. Place a drop of your hand cream on the microscope slide from the sample vial and carefully cover with a glass cover slip. Take care when handling the slide and cover slip.
2. Rotate the microscope's objective lenses so that the lowest power objective lens is above the stage.
3. Place the slide on the microscope stage and make sure the sample is in the middle. Secure the slide with the clips.
4. Adjust the height of the stage using the coarse focus dial.
5. Look down the eyepiece.
6. Increase the magnification by rotating the objective lenses to the next highest power and use the fine focus dial to bring the sample back into focus.
7. Draw what you see.

To answer

(a) Draw your hand cream sample here and label the oil and water.

(b) Explain why hand cream is an emulsion.
