

# Nanoparticles in sunscreen challenge

Download the teacher notes, PowerPoint presentation and student workbook that accompany this resource at [rsc.li/3cd4lcy](https://rsc.li/3cd4lcy).

Read our health & safety guidance, available from [rsc.li/3IAmFA0](https://rsc.li/3IAmFA0), and carry out a risk assessment before running any live practical. Be aware of any allergies before carrying out the activities.

The safety equipment suggested is in line with CLEAPSS requirements. For non-hazardous substances, wearing lab coats can help protect clothes. The safety rules might be different where you live so it is worth checking local and school guidance.

## ***Acknowledgements***

This resource was originally developed by Nottingham Trent University to support outreach work delivered as part of the Chemistry for All project.

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

## Equipment for room

- Computer and projector
- Kettle for boiling water
- Hot plates

## Activity 1: preparing your sunscreen

### Equipment

Per pair of learners:

- Eye protection
- 10 cm<sup>3</sup> measuring cylinder
- 1 × boiling tube
- 1 × 250 cm<sup>3</sup> beaker
- 1 × boiling tube rack
- Glass stirrer
- Glass marker pen

### Chemicals/materials

Per pair of learners:

- 6 cm<sup>3</sup> vegetable oil
- Around 40 yellow beeswax beads (approximately 1.5 g)
- Access to freshly-boiled water
- 5 g zinc oxide powder in a small tube

## Activity 2: estimating an SPF value for your sunscreen

### Equipment

Per pair of learners:

- Disposable nitrile gloves (one pair for each learner)
- 6 × pieces of transparent plastic (35 mm × 35 mm)
- 6 × disposable micropipettes
- Glass marker pen
- Film holder
- Sheet of light sensitive paper
- Spectrometer (UV light meter)
- Graph paper
- UV light source

### Chemicals/materials

Per pair of learners:

- 1 × UV sensitive dye in beaker (eg UV Condensate Drain Dye)
- 4 × samples of sunscreens with known SPF values
- 6 × small beakers of tonic water

### Preparation

Hold the transparent plastic in film holders so sunscreen smeared onto the slide can be placed between the UV light source and light sensitive paper. If film holders are not available, improvise another system for holding the plastic squares in place. For example, spread the sunscreen directly on to a small Petri dish or film placed on top of the Petri dish, which itself can either sit on the desk or be held in a clamp.

## Safety

It is essential that eye protection is worn.

Nitrile gloves should be worn.

Use low-voltage/battery-operated UV light sources in fixed housings to avoid the risk of UV light exposure causing skin or eye damage. Clamp them vertically in a stand with a cardboard roll or box lid placed to protect the learners from the UV light.

Although the oils and solids have low hazards, these will be heated on a hot plate. Be careful of splashing hot oil and avoid directly touching the hot plate.

The oil, beeswax and zinc oxide can be placed in the normal waste for disposal.

## Activity 3: presenting your findings

- Materials for making a poster