9. Testing sunscreen products

1 hour

Children learn that some materials must be physically changed to enable them to be used as ingredients for applications such as sun care products. They learn that different levels of UV protection can be provided by using different types and amounts of ingredients in sunscreen products and go on to test a series of sunscreen products and rank in order of protection level.

OBJECTIVES

- To compare and group together everyday materials on the basis of their properties
- To explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible
- To record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

RESOURCES

(Per group of 4 children unless otherwise stated)

- Bag of UV-active beads[1]
- Small samples (e.g. 5 ml) of factor 5, 15, and 50+ sunscreen Paper towels
- Tidy tray or shoe box
- 3 plastic cups
- Tea spoon
- Pipette or syringe
- Paintbrush
- 10 ml measuring cylinder

ADVANCE PREPARATION

Decant the sunscreens into three containers, e.g. yoghurt pots, labelled A, B, C

1 Bags containing 100-500 beads, that produce one colour or a variety of colours on exposure to UV light, may be ordered online from several suppliers.

INTRODUCING THE ACTIVITY

Use the website area Safe in the Sun - Sunscreen Test. The teacher introduces the lesson by asking the children what they know about sun protection factors (SPFs) and the importance of sun protection. The children could produce a KWL grid (what they know, would like to know and have learned) which they could complete after their investigations. The teacher explains that some exposure to sun is good for us but too much can cause premature ageing, wrinkling, burning and reddening of the skin.

The teacher reminds the children of their previous investigations and that industry makes ingredients that are used in sunscreens. Once the ingredient has been ground into powder and mixed into the liquid, industrial scientists must test the mixtures to see how effective they are. A high SPF sunscreen is good at stopping sun damage to the skin. Low SPF sunscreens also stop sun damage, but are less effective at doing so. The email on the Sunscreen Test website area introduces the activity to the children. The scientists have sent them three samples of sunscreen (A, B, C) and they would like the children to test them to see which one gives the best sun protection. Since we should not use our own skin for these tests, the industrial scientists has also sent some very special beads that change colour in UV light (sunlight).

ACTIVITY

The children discuss how they might test the sunscreens. They must decide how they might apply the sunscreen to the beads and how they can make sure their test is fair. They may decide to measure the same amount of sunscreen each time using spoons, pipettes, syringes or small measuring cylinders. They could use a brush or a spray to coat the beads or apply the sunscreen by putting a measured amount in their hands and rubbing the beads. The activity should be carried out away from external windows if possible, until the beads are to be taken outdoors. This will minimise any colour changes in the first stage of the experiment. Each set of beads could be placed in a tray or box, should be kept covered until taken outdoors and then exposed to the light for a short time. The children then observe the colour change, place the beads in order of protection afforded by the sunscreen and record their results. They predict which SPF they think matches each sample of sunscreen, by closely observing the degree of colour change produced in each case.

PLENARY

Returning to the second screen in the Sunscreen Test area, the children choose which sunscreen gives the greatest protection. The results from the class activity are then discussed:

Did all groups record similar results?

Which sample do they think had the highest SPF? Why?

How did they ensure that they carried out a fair test?

How would they improve their test?

How did their test result compare with that in the animation?

QUALITY CONTROL

The subsequent web pages in this section introduce quality control and allow the children to 'test' samples of sunscreen and interpret results displayed in the form of a graph. The children can also learn about the uses of UV protection for various products.

AMBASSADOR ROLE

Ambassadors could enhance and support the classroom activities by providing UV reactive beads, photographs of sunscreen tests from the laboratory, together with simple tables and/ or graphs of actual results. The children might also wish to report the results of their investigation to the ambassador and ask questions.

BACKGROUND INFORMATION

Some companies which make active ingredients for sun care products do not sell sunscreens directly to consumers. However, companies have 'Formulation and Claims Testing' departments, in which they prepare sunscreen products to test that they perform as effectively as they should. These formulations are tested for their Sun Protection Factor (SPF) and protection against UVA radiation, amongst other properties.

UV active beads change colour in sunlight because they are made from a special reversible photochromic material. This material changes its chemical structure when exposed to ultraviolet light (like sunlight), allowing it to absorb a coloured pigment or dye. Once out of the sunlight it becomes colourless again.