

Sunscreens - Notes for Teachers

Links to Capabilities
Links to Curriculum

Scientists say that it is the UV light from the sun causes sunburn and if this happens too much it can lead to skin cancers later in life. To prevent harm from the Sun you must block out the UV light. An easy way to do this is to use sunscreen, but are all sunscreens as good as others

Investigation

Part 1

Aim: (what you are trying to find out)

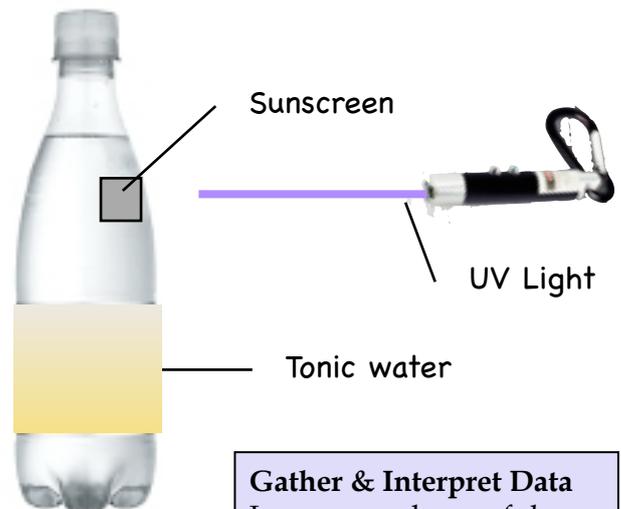
To show that Sunscreen blocks UV light

Method:

What you need-

- a source of UV Light (pointer or tube light) Using two UV lights is better, allowing you to make a comparison
- a bottle of tonic water - with quinine in it
- a sunscreen

See resources below for possible sources of UV lights



Gather & Interpret Data
Learners make careful observations and differentiate between observation and inference.

Recording Results

You may wish for your students to keep a record of their observations they could:

- write what they saw
- draw a diagram
- take a photo of the experiment
- film the investigation
- or any combination of the above

This will provide them with evidence that may be used to explain what they have found out (Make a conclusion. A conclusion is a statement that uses information collected to answer the aim)

Achievement Aim - Nature of Science
Communicating in science
• Develop knowledge of the vocabulary, numeric and symbol systems, and conventions of science and use this knowledge to communicate about their own and others' ideas.

What have you found out?

From the experiment we carried out and the information we collected we can say...

The evidence that backs this up is ...

Use Evidence
Learners support their ideas with evidence and look for evidence supporting others' explanations.

Part 2

How do you know that it is sunscreen that blocks out the UV? Maybe something like mayonnaise would do just as good job

Aim: to see if any cream can block out UV

What we did:

Repeat the first experiment

You may ask the children to design this experiment

allow children choose the different creams used based on their own understanding of substances available

When designing their experiment get them to think about:

How thick is the cream? Does that make a difference?

What other creams could you try?

How do you make sure the UV light goes through the cream?

What about different SPF's? What difference do these make?

and other things they will come up with

Allow the students to come up with the questions and then design the investigation.

Ensure they collect some evidence to help them answer what they are trying to find out (aim).

Communicating Findings

Think about how your students are going to communicate what they have found out.

Poster, e-presentation, talk etc using appropriate language and scientific conventions.

Achievement Aim - Nature of Science Investigating in Science

• Carry out science investigations using a variety of approaches: classifying and identifying, **pattern seeking**, **exploring**, investigating models, **fair testing**, making things, or developing systems.

Interpret representations

Scientists represent their ideas in a variety of ways, including models, graphs, charts, diagrams and written texts.

Achievement Aim - Nature of Science Communicating in Science

Develop knowledge of the vocabulary, numeric and symbol systems, and conventions of science and use this knowledge to communicate about their own and others' ideas..

Background information: Tonic water contains a substance called Quinine. As the quinine absorbs the UV light it causes it to fluoresce (give out visible light).

Quinine is a naturally occurring chemical that was used to help prevent malaria. Originating in South America it is obtained from the bark of the cinchona tree.

Quinine has been used for more than three centuries and until the 1930s it was the only effective agent for the treatment of malaria.

The British in Colonial India used Quinine in tonic water to fight malaria and added Gin to it to take away the bitter taste.

[http://
humantouchofchemistry.com/
/quinine-a-miracle-against-
malaria.htm](http://humantouchofchemistry.com/quinine-a-miracle-against-malaria.htm)

Read more
about
Quinine
here



Part 3

If you take the a bottle of tonic water out into the sun you don't see it change colour. How do you know that the sun is producing UV light?

Aim: to show that the sun produces UV light and how Sunscreen can block it

What you need-

Eight UV Beads

A4 Transparent Plastic Sheet and A4 White Card

UV light

Sunlight



See resources below for possible sources of UV lights

What you should do -

The method provided comes from the Science Learning Hub

but there are other methods that could be used.

Give the beads to the students to explore with, in and out of the sun, with and with out covering and then ask them to design their own investigation. You may wish to help them determine their specific aim (exactly what they are trying to find out) and this may help focus them on their experimental design.

Gather & Interpret Data

Learners make careful observations and differentiate between observation and inference.

Some suggestions for Treatments

- use different brands of sunscreen
- different SPF sunscreens
- expired v current sunscreens
- non sunscreen products with SPF
- sun glasses lenses
- medicine bottles
- different types of clothing material

You can also try different light sources, and placing beads so light comes through different glass windows and many more

Achievement Aim - Nature of Science Investigating in Science

- Carry out science investigations using a variety of approaches: classifying and identifying, **pattern seeking**, **exploring**, investigating models, **fair testing**, making things, or developing systems.

Don't forget that you are using beads so they can be put onto a thong or cord and used as a bracelet - indicators for if the UV light is too strong.

What have you found out?

How are you going to collect evidence?

See above

From the experiment we carried out and the information we collected we can say ...

The evidence that backs this up is

Reflection

Do you feel you have produced enough evidence to be convinced that wearing sunscreen is a good thing?

What other evidence could you provide?

Critique Evidence

Not all questions can be answered by science.

In order to evaluate the trustworthiness of data, students need to know quite a lot about the qualities of scientific tests.

Why is Sunscreen Use a Big Issue?

Who could you talk to about the damage UV can do to our bodies?

How else can we protect ourselves from too much sun?

Why is NZ such a dangerous place for being in the sun?

and many more questions can lead to opportunities to do research, talk to/from health professionals, design and carry out more investigations

Engage with Science

This capability requires students to use the other capabilities to engage with science in 'real life' contexts.

Achievement Aim - Nature of Science Participating and Contributing

- Bring a scientific perspective to decisions and actions as appropriate.

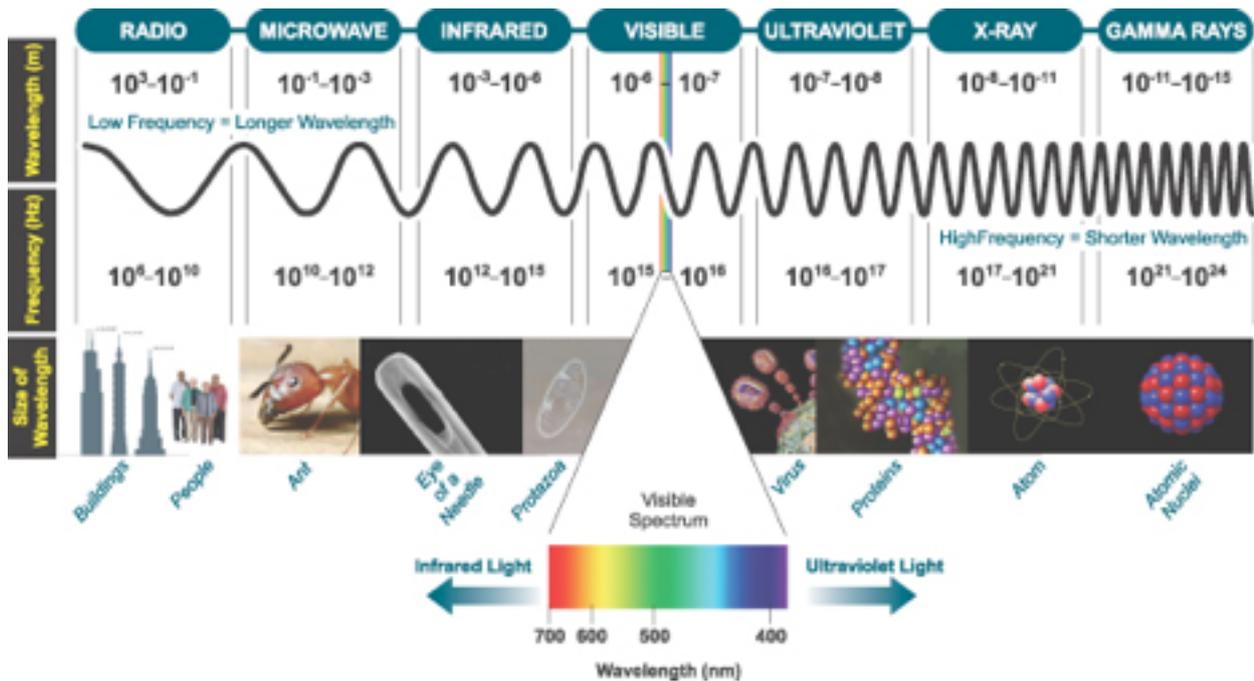
What are UV beads

These are plastic beads that contain a pigment that changes colour when in the presence of UV light. The stronger the UV the brighter the colour. They will change back to white (slowly) when taken out of the UV light. To check how they work shine a UV light source on to two or three beads and observe.

http://www.arborsci.com/Data_Sheets/P3-6500_DS.pdf



Information about Light



Electromagnetic Spectrum

Light is a form of energy. It is part of a spectrum of energy called Electromagnetic Radiation. The visible part of this spectrum is what we call light.

Visible light ranges from red light with wavelengths starting around 700nm (0.7µm) to violet light with wavelength around 400nm (0.4µm).

Sources of light are either **incandescent**, using heat to produce light (sun) or **luminescent**, which are cooler and are produced by a chemical reaction (glow stick)

Light travels at 299 792 458 m/s (That's nearly 300 000 km/s!)

Light takes about 8 minutes and 20 seconds to reach the Earth from the Sun.

Light travels in straight lines.

Light behaves like waves so has a frequency and wavelength

It also behaves like particles which are called photons.

Visible light is a small part of the spectrum. To either side of it you find UV (Ultraviolet) and IR (Infrared). These both have a range of wavelengths and therefore a range of different energies

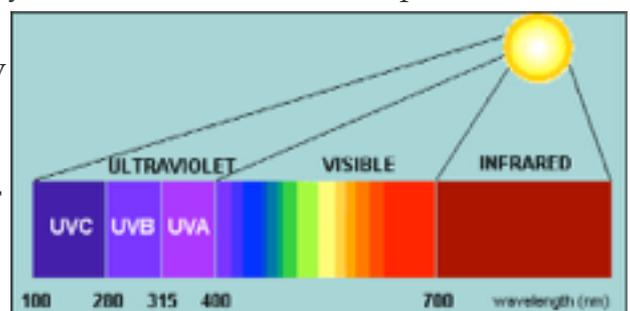
Ultraviolet light has more energy than visible light, with wavelengths ranging from 100 nm to 400 nm.

The major source of UV is the sun but there are also man made UV lamps.

UV rays are divided up into UV-A, -B and C. With UV-A having the least energy and UV-C having the most.

UV light can be harmful to humans, as the amount of energy it contains can damage the skin cells and cause deformities. This is the damage done by sunburn and too much exposure to sunlight.

UV-C light never reaches the earth as it is absorbed by the ozone layer, while some UV-B, and all UV-A, makes it to the surface. That is why it is important to protect yourself from the sun's rays, by covering your skin and/or using sunscreens.



Resources

Websites

Capabilities

<http://scienceonline.tki.org.nz/Introducing-five-science-capabilities>

NZ Curriculum Learning Areas Achievement Objectives in Science

<http://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum/Learning-areas/Science/Achievement-objectives>

Science Learning Hub

You Me and UV

<http://sciencelearn.org.nz/Contexts/You-Me-and-UV>

Light and Sight

<http://sciencelearn.org.nz/Contexts/Light-and-Sight/Science-Ideas-and-Concepts>

SunSmart Schools

www.sunsmartschools.co.nz/teachers/curriculum-resources.

Equipment

UV Torches, UV Beads

Crescendo Enterprises

<http://www.crescendo.co.nz/Default.aspx>

UV strip lights, UV LED's, UV button torches

LED Stuff

<http://www.ledstuff.co.nz/>

Jaycar Electronics

<http://www.jaycar.co.nz/>

UV Beads

(look around to find the best deal and don't forget Trademe or do a search on the net. These have become more popular recently and some are linked with Loom Bands. There are even some UV detecting bands)

Crescendo Enterprises

<http://www.crescendo.co.nz/Default.aspx>

Starlab Astronomy

<http://www.starlab-astronomy.co.nz/uvbead.htm>

Electroflash

<http://www.electroflash.co.nz/products/view/603>

Boodlesbuys

<http://www.boodlesbuys.co.nz/products/100-tropical-colored-solar-uv-reactive-plastic-beads-for-loom-kits>

Make your Own UV Torch

<http://www.instructables.com/id/Ultraviolet-Torch/>

High Density Foam from Para Rubber



3mm UV LED
from LED Stuff

Battery CR2032 Button Cell 3V

Plastic Card cut in half
(donated from card making
firm but old card suitable)



Card stuck onto foam
with double sided tape

Battery is thinner than
foam so light will only go
when pressure is applied
and LED pins make
contact with battery



***Remember** LED's only
work in one direction, (long
pin on + side of battery) so
turn the LED around if it
does not work the first time.

Simple Key ring UV torches work well



LED Key Ring from LED Stuff



UV light through green dish washing
liquid causing fluorescence