

UV Beads Family Challenge

What do SPF numbers tell you about the effectiveness of a sunscreen?



Materials

black cardboard with UV beads • cotton swabs • 4 sun protection products (such as sunscreens and sunblocks) having a wide range of different SPF ratings

Test a Sunscreen with UV Beads

1 While inside, observe the cardboard with plastic beads and numbers on it.

? What color are the beads?

2 Take the bead board outside in the sunlight or place next to a window and observe.

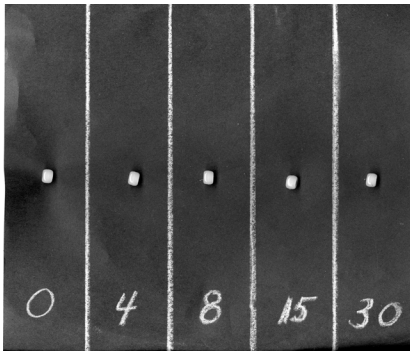
? What color are the beads?

3 The numbers written below the beads correspond to SPF numbers of sunscreen. (The bead labeled zero is a control—do not apply sun protection product to this one.)

Find the sun protection product with an SPF number that matches the first number. Use a clean cotton swab to smear a small amount of the appropriate product on the plastic bag directly over the bead. Spread the sun protection product into a circle that is about 1½ inches (about 4 cm) in diameter. Circles of this size should provide protection to the tops and sides of the beads.

4 Repeat step 3 for each bead. Be sure to use a clean cotton swab for each sun protection product. Apply the same amount of product evenly over each bead.

5 Write down the name and SPF of each sun protection product and the starting shade of each bead in the data table. Also record the time of day and weather conditions (such as sunny, partly sunny, or cloudy).



The SPF numbers on your board may differ.

Sunscreens, SPF, and UV Rays Data Table			
Name of Product	SPF	UV Bead Shade	
		Start	After Sun Exposure
no sunscreen	0		
Time of day and weather conditions:			

- 6 Take the setup outside in the direct sunlight. Without removing the plastic bag, immediately observe and record the shade of the beads (such as white, nearly white, light, medium, or dark). If you can't determine the shade of the beads through the sunscreens, take the beads indoors, open the plastic bag, and observe the shade of the beads immediately (so that the color does not significantly fade).
- ? Compare the shade changes of the beads with the SPF ratings of the products covering them. What is the trend?
-

- ? If you were doing this test for a commercial to sell sunscreen, do you think this experiment would convince people to buy one particular sun protection product over another? Explain your answer.
-

Explanation

Ultraviolet (UV) radiation is a dangerous, high-energy form of light that is invisible to the human eye. A sunburn or a tan is your body's response to injury from UV radiation.

When UV detection beads are exposed to direct sunlight, they change to a darker shade. These special beads detect UV radiation.

When you coat UV detection beads with different sun protection products and then expose the beads to sunlight, you can determine the effectiveness of these products against UV radiation.

As you might expect, the SPF ratings of the products correlate with how quickly and how deeply the beads change shade. Beads covered with no sun protection product or low SPF product quickly change to a deep shade, while those covered with a maximum protection (SPF 30 or higher) product remain white or nearly white. Beads covered with intermediate levels of SPF show a change somewhere in between. You should see the general trend from low SPF (darker bead shade) to high SPF (lighter bead shade).

This experiment might help to sell sun protection products because buyers can see the shade changes of the UV beads. A bead protected with a sun protection product stays whiter than an untreated bead, showing that exposure to UV radiation is reduced by the product.

Try at Home

Your risk of skin cancer from exposure to the sun's UV radiation depends on your skin type and the amount of UV radiation you are exposed to. The UV Index is a number between 0 and 16 that tells you what the intensity of UV is at noon for a specific day and location. The higher the number, the more intense the UV is.

Find your local UV Index for any given day by going to the United States Environmental Protection Agency (EPA) website at www.epa.gov/sunwise/uvindex.html. You can search for your local data by zip code or by looking on the map. Other possible sources for your local UV Index are the Weather Channel or a local newspaper. (You may want to keep track of the UV Index for several days and also record it at various times throughout the year to see how it varies between seasons.)

Determine your skin type (phototype) by going to dermnetnz.org/reactions/phototype.html. Phototypes vary from I (burns easily) to VI (rarely or never gets sunburned). Phototype is usually based on skin and hair color. People with pale skin and blond hair usually burn the easiest, and those with dark skin and black hair are less likely to get sunburned.

Look up your burn frequency (how long you can be in the sun before you burn) and your local UV Index on the chart at www.erh.noaa.gov/ilm/beach/uv/mintoburn.shtml. How long can you stay out in the sun today without burning?

To learn more about UV and the UV Index, go to the Strive to Thrive! website at www.terrificscience.org/thrive/knowmorepdf/uvindex.pdf.