

Ouch! Sunburn Science

Grade Level 2-8



What you need:

- UV beads (purchase through stevespanglerscience.com)
- Hand lenses
- Pencil/paper to record data
- Small plastic containers of sunscreen samples (3 different SPF sunscreens for each group labeled A, B, & C)
- Plastic bags, paper plates, trays (e.g., containers to hold beads)
- Markers
- A sunny day

What to do:

1. Divide the students into groups of three or four. Each group receives 12-20 UV beads and 2 hand lenses.
2. Ask each group to use their powers of observation to determine what these objects might be. Have each group record their observations.
3. Have each group share their observations. Write down their collective thoughts on a white board.
4. Now, give each group about 5 minutes to take the beads outside in the sun and observe what happens.
5. Return to the classroom and record the groups' observations alongside their first thoughts on the board (use a T-chart format).
6. Tell the class that these are special photosensitive beads. Ultraviolet rays from the sun turn the beads color.

Investigate

1. Ask the groups to reflect on this statement: When we go outside, scientists and doctors tell us to protect our skin from UV rays by using sunscreen. How can these UV beads help us learn which sunscreens might work the best?
2. Provide each group with three samples of sunscreen and have them decide how to set up an experiment and record data that will allow them to determine the possible effectiveness of each sunscreen. Tell each group to rate the color of the beads on a scale of 1-5, with 5 showing the most color or "burning" and 1 showing the least color. Have them create one sample without sunscreen.
3. Allow them time to set up the experiment. Groups will check their results and record data later that day (or at an interval determined by the teacher).

Conclusion

Have each group report:

- (1) How they tested the sunscreen using the beads, (2) the data they collected, and (3) what conclusions they drew. Ask them why the effectiveness might have differed among the different samples.

Investigate Further

1. How could you use the beads to test the effectiveness of other items' UV protection levels? – ideas: sunglasses, clothing. Give each student a few beads to take home and set up further investigations

Learn

Ultraviolet light (also called UV light) is a type of *radiation* (wave energy) that is not visible to the human eye. None of the energy in the ultraviolet region of the light spectrum is visible to the naked eye. Most of the UV light produced by the Sun is blocked by the atmosphere, but some UV light does reach Earth. UV light is the invisible radiation that will give you a sunburn and can injure your eyes. Sunglasses and sunscreens absorb UV photons to help protect your skin and eyes from this type of radiation. UV radiation wavelengths are short enough to break chemical bonds in your skin tissue. With prolonged exposure to UV light, your skin may tan, burn, wrinkle, or even develop skin cancer.

The UV beads are made from white or clear plastic. While you cannot see UV light, the high-energy light excites the photochromic dye (dye that changes color when it reacts with ultraviolet light) in the beads resulting in a change in the shape of the dye molecules.

Interesting fact: Although UV light is needed to excite the molecule to form the high-energy planar structure (color change), heat from the surroundings provides the activation energy to change the molecule back to its colorless structure. If colored beads are placed in super cold liquid nitrogen, they will not have enough activation energy to return to their colorless form.

This activity can also be found as a downloadable pdf file on our website at www.nwocenter.org/handson.htm

