

Solar Energy Beads

Subject: Environmental Science

Grade Level: 5th Grade

Rationale or Purpose: This activity helps students to learn about ultraviolet light, solar radiation, and the possible harmful effects radiation can have on the eyes and skin.

Materials:

- Solar energy beads
- Sunglasses (with and without UV protection)
- Sunscreen (SPF 8 and SPF 30)
- Several small boxes

Required Documents:

- Lab Worksheet

Lesson Duration: Requires that students test beads in sunshine and in cloudy weather, so it must be done on more than one day. Total duration should be about an hour.

Source: <http://www.eia.doe.gov/kids/classactivities/teachers&students.html>

5th Grade Science TEKS: 2(A), 2(B), 2(C), 2(D)

Background Information: Solar energy beads allow students to detect wavelengths of radiant energy call ultraviolet light. The energy in the ultraviolet region of the light spectrum is not visible to the naked eye.

When bare skin is exposed to sunlight for a long time, it can burn or tan. UV radiation wavelengths are short enough to break chemical bonds in skin tissue. Over a long period of time, and with repeated exposure to UV radiation, skin cells can be damaged; skin may wrinkle or skin cancer may develop. Sunglasses and sunscreens absorb UV photons, which protects your eyes and skin from solar radiation. You can test the protective quality of sunglasses and sunscreen with UV detecting solar energy beads.

Solar beads have a chemical substance embedded in their plastic containing a pigment that changes color when exposed to UV radiation. The beads are not affected by visible light, such as the light from a light bulb, and remain white, or pale, indoors as long as they are kept away from windows or doors through which UV light can enter a room.

Activity: Students will be able to observe changes in color of the beads to test the sun's effects in varying situations. Students will connect the effect the sun has on the beads to the effect the sun has on their skin.

Procedure:

1. Discuss with students the concept of UV rays, asking them what they think UV rays are, how the rays can affect them, etc. Give each student, or group of students enough beads to use for several parts of the experiment. Pass out the lab worksheet and have the students go outside, being careful to keep the beads covered (perhaps in a cardboard box).
2. Once outside, have the students test several situations: bright sunshine, clouds, sunglasses with and without UV protection, and sunscreen with different levels of SPF. These activities will require more than one trip outside so that students can test cloudy weather and sunny weather. Make sure students carefully record what they observe on their lab sheets.
3. After students have completed the observation portion of their lab sheet, have them return to the classroom and discuss what they observed. Were they surprised by the reactions of the bead? Did this activity make them think twice about going out without sunscreen (even in cloudy weather)? Were they able to think of some other tests they'd like to perform with the beads?
4. Finally, have the students answer the questions at the bottom of the lab sheet.

Name _____

Date _____

Solar Energy Bead Lab Sheet

1. Fill in the chart below with your observations from outside.

Experiment	Instructions	Observations
Sunny weather	Lay several beads out on the sidewalk or in the grass	
Cloudy weather	Lay several beads out on the sidewalk or in the grass	
Sunglasses (no UV protection)	Put some beads underneath the lenses of the sunglasses	
Sunglasses (UV protection)	Put some beads underneath the lenses of the sunglasses	
Sunscreen SPF 8	Slather several beads in sunscreen before you go outside	
Sunscreen SPF 30	Slather several beads in sunscreen before you go outside	

2. Describe any significant differences you saw in the reaction of the beads between cloudy/sunny weather? The two types of sunglasses?

The two levels of sunscreen? _____

3. If UV radiation can have such a drastic effect on these beads, can it affect your body too? What kind of effects can the sun have?

4. What specifically can you do to protect yourself?

5. What other types of materials do you think we could test with the solar beads?

