

Put UV BEADS: PRESENCE OF ULTRAVIOLET LIGHT

Background Information:

How Do Solar Energy Beads Work?

Solar beads have a chemical substance embedded in their plastic containing a pigment that changes color when exposed to ultraviolet (UV) light. 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.

What is Ultraviolet Light?

The Sun gives off light we can see (visible light) and also some light that we can't see (ultraviolet light). Since we can't use our eyes to detect ultraviolet (UV) light, we need to find other ways to see the "invisible". Solar energy beads are one way.

Ultraviolet light is made of long and short waves. Long wave ultraviolet light is often called "black light." This is the light that makes objects appear to glow in the dark. Long wave UV light passes easily through plastic and glass.

Short wave ultraviolet light is used to kill bacteria, speed chemical reactions, and identify fluorescent minerals. Short wave UV light can't pass through most plastic or glass. The shortest UV wavelengths in the air are absorbed by oxygen molecules and convert the oxygen into ozone.

UV Radiation Can Damage Eyes and Skin!

When bare skin is exposed to sunlight for a long time, it can tan and sometimes even burn. Over a long period of time, and with repeated exposure to UV light, skin cells can be damaged causing skin to wrinkle and sometimes even leading to skin cancer. Wearing sunglasses, sunscreens, hats and long sleeved shirts can help protect you from the Sun's harmful rays.

Materials:

- UV Beads
- Leather straps or pipe cleaners
- Various containers (Jar, prescription bottle, cardboard box, clear plastic bottle, tin can, solid plastic container, etc.)

Activity:

1. Have participants string the beads on the leather straps.
2. Observe the beads indoors. What color are they?
3. Observe the beads outdoor in the Sun. What is happening to the beads? What color are they now? How are they different from when they were indoors? Justify your answers.
4. Observe the beads indoors again. What color are the beads now? Why do you think the beads change color when you go outside and turn white when you come indoors? Where does the Ultraviolet Radiation come from? Justify your answers.
 - a. How do the UV beads indicate the presence of UV radiation?
 - b. How do the UV beads indicate little or no presence of UV radiation?
5. Observe the beads outdoors in the shade. What color are they? How are they different from when they were indoors and when they were in the Sun? What do you think it means? Where is Ultraviolet Radiation present? Where is Ultraviolet radiation strongest? Justify your answer.
6. Look through the containers and decide which ones you think will block UV light. While outdoors, try putting the beads in the various containers. Which containers block out UV light? Are they different than the ones you had predicted?

TRY THESE EXPERIMENT IDEAS AT HOME!

The Sunscreen Test: *Testing the effectiveness of sunscreen to block UV radiation*

We wear sunscreen to protect our skin from UV radiation. You can test the protective quality of sunscreen using your UV detecting solar beads. Soak two of your solar beads in sunscreen SPF 15 and two in SPF 45+. Let each dry for about 60 minutes before beginning your test. Do not apply any sunscreen to the remaining two beads. Place each set of beads on a sturdy paper plate, label each plate (SPF 15, SPF 45+, nothing) and cover each with a dark cloth and take them outside. Once in place, take the dark cloth out and expose all beads to sunlight. Which beads turned the darkest? Which sunscreen, if any, is most effective at protecting our skin from UV light? How can you tell?

The Sunglasses Test: *Testing the effectiveness of sunglasses to block UV radiation*

Sunglasses help protect your eyes from UV radiation. You can test the protective quality of sunglasses using your UV detecting solar beads. Take your UV beads and put them on a sturdy paper plate, cover them with a dark cloth and place the plate in the Sunlight. Take your first pair of glasses and place it directly above the beads so that the only sunlight reaching the beads is being filtered through the glasses. When you think you are ready, remove the dark cloth. How long does it take the beads to change color? Are they as dark as they were when placed directly in the sunlight? Now repeat the experiment with a different pair of sunglasses. Which sunglasses protect your eyes the most?

The Window Test: *Testing the effectiveness of glass to block UV radiation*

Some windows are specially made to help filter out the Sun's harmful UV rays. While in your house, stand by a window with your UV Beads in hand. What color are they? How are they different then when you are outside and the UV beads are in direct sunlight? Now sit in your car and hold the beads in your hand behind the car's windshield. What color are the UV beads? How are they different from when you were standing behind the window in your house? Try one of the side windows of your car. Did the beads change? Some windows filter out the UV radiation; others don't. The front windows of automobiles usually filter out UV radiation, the side windows don't.

The Cloudy Day Test: *Testing whether clouds help block UV radiation*

You know what the UV beads look like in direct sunlight. Take them out on a cloudy or overcast day. What color of the UV beads? Does it matter if the day is sunny or cloudy? Can you still get a sunburn on a cloudy day? The UV beads change more quickly when the Sun is directly overhead but they still change even on a cloudy day.