

# Primary/Elementary Activity: Exploring Solar Beads

Solar energy beads, also called ultraviolet light detecting beads, are not only fun to watch as they change colors, but they can be used to teach about ultraviolet light and possible harmful effects of solar radiation.

## 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) 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.

**Ultraviolet radiation in sunlight reacts with the chemical in the beads to cause the change in color.** Each bead will change color about 50,000 times before the pigment no longer responds to UV light.

## What Is Ultraviolet Light?

Solar energy beads allow us to detect wavelengths of radiant energy called ultraviolet light. The energy in the ultraviolet region of the light spectrum is not visible to the naked eye.

Ultraviolet light is made of long and short waves. Long wave ultraviolet light (300 to 400 nanometers) 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 (100 to 300 nanometers) is used to kill bacteria, speed chemical reactions, and identify fluorescent minerals. Short wave UV light can't pass through most plastics 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 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.

- Test your sunglasses by placing them in sunlight and covering a few solar energy beads with the lenses (or shadow of the lenses). Place a few beads in direct sunlight next to the sunglasses for comparison. If the beads under the sunglasses remain white, then the sunglasses are blocking harmful ultraviolet rays.
- Test the effectiveness of sunscreen by coating a few beads in the palm of your hand. Hold a few uncoated beads in your other hand for comparison. Place your hands in direct sunlight. If the coated beads remain white, then your sunscreen is blocking harmful ultraviolet rays.

## Additional Test Ideas

- Place beads near fluorescent lights or "black light."
- See if beads change color on a cloudy day.
- Observe beads exposed to sunlight at different times of day.
- Test a variety of glass and plastic containers to determine which materials block out UV light.

For more information, visit the Florida Solar Energy Center's website at [www.fsec.ucf.edu](http://www.fsec.ucf.edu). To order solar energy beads, visit [www.teachersource.com](http://www.teachersource.com).

