

UV beads

(No hat, no play, no school today)



Background

This is an inexpensive and fun activity which encourages students to use their senses to collect data, make predictions and gives them a reason to support school rules.

Our human eyes only register the visible spectrum of the Sun's radiation (Red, orange, yellow, blue, indigo and violet colours which together produce white light). The Sun also releases invisible energy such as infra red radiation (heat) and ultraviolet radiation (which can cause skin cancer on over exposure). Some insects, scorpions and birds glow in ultraviolet light.

UV beads contain a pigment which will change colour on exposure to ultraviolet light. Normal indoor lighting does not affect them. Each student is given one bead threaded on a pipe cleaner. Twisting the pipe cleaner will ensure that the bead does not roll away.

Science demands data that is **observable** and **repeatable**. **Fair testing** requires that we only change one thing at a time. We will observe the bead and change its position from inside to outside.





Observable

- Explain that we normally only use four of our five senses (taste being too dangerous).
- Divide students into four groups (one for each sense) and board their observations).
- Observation should be objective. Subjective observations such as "large" or "nice" are not used as they mean different things to different people.
- Observations should be boarded by the teacher or students

Repeatable

- Students agree that their observations are repeated across the class (same students, same room, same day etc)

Suggested observations of the bead

| Sight  | Touch  | Smell  | Sound  |
|--|--|--|--|
| Round/cylinder White Translucent Hole Solid/hard Join | Smooth Round/cylinder Join Hole Solid/hard | No smell | No sound |

Younger students may wish to use their eyes like a camera to remember what the bead originally looks like.

Fair test

In Science we only ever change one thing/variable in our experiments. We measure any change against the original or control observations. Even under overcast and raining conditions sufficient ultraviolet light will penetrate the clouds to affect a change in colour. The yellow/gold beads have the most subtle colour change and you may wish to pre-test the beads and remove these for younger students.

Ask the students to use the same senses they used indoors and make observations on the bead.

Ask the students then to use the same senses and find if they can sense something different outside which might have caused this change.

Usual student answers are heat, light, wind and mood

You may ask students (Y6&7) to **predict** what they think might happen when the bead is returned indoors.

Return indoors and students test their guesses for the same period of time (10 seconds?)

| Idea | Test |
|-------|--|
| Heat | On the <i>outside</i> of their clothes, place the bead under their armpit |
| Wind | Blow on their bead |
| Light | Shine a torch or hold the bead up towards a ceiling light |
| Mood | Split the class into two. One half whispers kindly to the bead whilst the other whispers mean thoughts |

Explain that we are limited by our senses. Like other forms of energy, UV light can only be inferred by the effect it has on other things. (E.g. Newspaper going brown on prolonged exposure to sunlight and plastics breaking down and becoming crumbly). If you have a UV torch demonstrate repeated colour change on the purple beads.

Extensions

Place bead under school hat to demonstrate how the hat shields us from UV rays.

Place bead under sunglasses to demonstrate good ones.

Put sunscreen on bead to find if it still works.

Test the effectiveness of sports clothes and rashies