Experiment 1b: Which materials are suitable for an astronaut's visor?

Mission brief:

While on spacewalks, astronauts need to see clearly but still be protected from UV light.

Mission objective:

Find a transparent material to fulfil this role.

Mission directive:

Investigate how well different materials block UV light and find the best one for an astronaut's visor.

Method

1. Before carrying out the experiment, discuss what properties a spacesuit visor may need and what materials you would like to test.
2. Become familiar with any colour changes that take place when the beads are inside or outside in the sunlight. (NB note how quickly they change colour when brought indoors)
3. Predict the colour change you expect for each material using the colour chart numbers.
4. Write your predictions in the results table.
5. Place four petri dishes in a box (without lids).
6. Place one bead in each petri dish and choose your first material to test.
7. In petri dish 1: cover the bead with one layer of your chosen test material.
8. In petri dish 2: cover the bead with two layers of your chosen test material.
9. In petri dish 3: cover the bead with three layers of your chosen test material.
10. In petri dish 4: leave the bead uncovered to act as a control.
11. Take the box outside to expose the samples to the sunlight (for ground floor classrooms you could hold the samples outside an open window.) Wait for 30 seconds or until the control turns to the deepest colour on the chart (number 10), whatever is first.
12. Quickly bring the box inside and remove the materials to reveal the beads' colours. Make a nearest match on the colour chart.
    (NB the bead may lose colour quickly. If the change is too quick to record, repeat steps 7–11).

    TIP: take a photo of the beads to help with the colour chart reading.
13. Record the colour chart number for each experiment layer on the results table.
14. Repeat with more materials or compare class data to complete the results table.
15. Post your results to **http://rsc.li/mission-starlight** and compare with schools worldwide.

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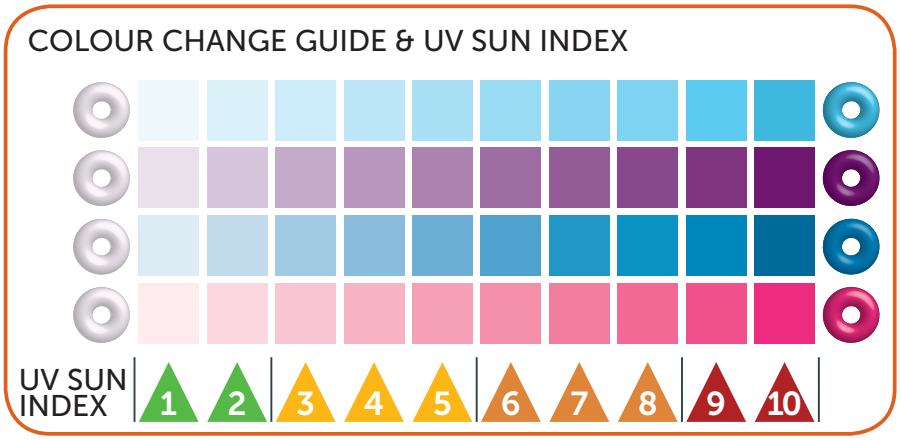

Results

Material	Prediction	One layer – results	Two layers – results	Three layers – results
Polystyrene (eg petri dish plastic)				
Polyvinyl chloride (eg cling film)				
Red coloured cellophane (eg sweet wrapper)				
Yellow coloured cellophane (eg sweet wrapper)				

Conclusions

- From your results, which material do you feel is most suitable for an astronaut's visor?
- Why is it important to have a control bead in your experiment?
- Did increasing the number of layers of each material give the result you predicted?
- Can you think of how you could improve this experiment and/or the recording of the results?

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