



## Experiment 2: Can liquid coatings block UV light?



### Mission brief:

Astronauts complete many EVAs whilst in space. EVA stands for 'extra vehicular activity' but this is commonly known as a spacewalk. During a spacewalk, astronauts are exposed to the full glare of the sun so this is when they need the best protection. Spacesuit materials alone offer some protection from UV light, but can we do better?

### Mission objective:

Find out if liquid coating can be used to block UV light.

### Mission directive:

Investigate the UV protection provided by different depths of liquids.



### Method

1. 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)
2. Predict the colour change you expect for each liquid using the colour chart.
3. Predict how effective at blocking UV light you think one thin coating will be for each liquid using the colour chart.
4. Write your predictions in the result table.
5. Place four petri dish bases in a box (without lids).
6. Place one bead in each petri dish and stack either an upturned lid or a second petri dish base on top (see diagram 1).
7. Choose your liquid to test and paint a thin layer of the liquid on the surface of the upturned lid/top petri dish base. (you could label this if needed)
8. Measure out 10ml of the liquid and add this to the surface of a different upturned lid/top petri dish base. (you could label this if needed)
9. Measure out 30ml of the liquid and add this to the surface of the final upturned lid/top petri dish base (you could label this if needed).

You should also have a control petri dish (see diagram 1).

10. Take the box outside to expose the samples to sunlight. (For ground floor classrooms you could hold the samples outside an open window)
11. Wait for 30 seconds or until the control turns to a deep colour.
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).

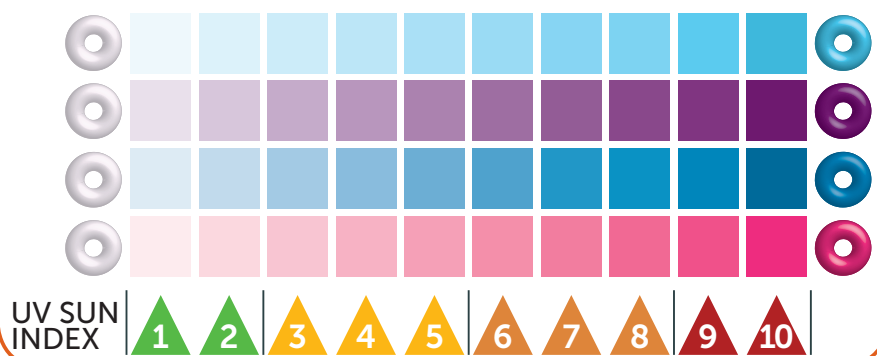
TIP: take a photo of the beads to help make the colour chart reading.

13. Record the colour chart number for each liquid sample on the results table.
14. Repeat with different liquids or compare class data to complete the results table.
15. Post your results to <http://rsc.li/mission-starlight> and compare with schools worldwide.





### COLOUR CHANGE GUIDE & UV SUN INDEX



### Results

Liquid	Prediction	Thin coat	10ml	30ml
Vegetable oil				
Black tea				
Sun cream (SPF 8–10)				
Tap water				



### Conclusions

- From your results, what happened to the colour of the beads as the depth of the liquid was increased? Suggest an explanation for why this may have happened.
- How close were your predictions to your results?
- From your results, which were the most effective liquids at blocking UV light? Suggest how you can use this information in your everyday life.
- Can you think of how you could improve this experiment and/or the recording of the results?