Is there a lot or a little UV - radiation in the light ?

SMART KIDS LAB
Step by Step

SMART KIDS LAB

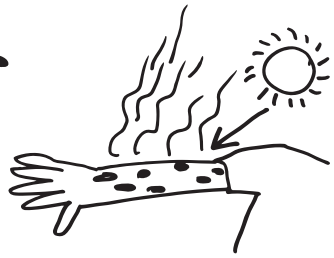
How clean is the air you breathe? Is swimming water the same as drinking water? How many microbes live in the soil beneath your feet? And what does it all mean? DISCOVER how healthy your neighbourhood is and what you can do to improve it. SMART KIDS LAB lets you examine the water, noise, air, earth and light around you with homemade measuring instruments. On the smartkidslab.nl website, you'll find out how to make the measuring instruments (meters) and how you can GET STARTED.

HOW MUCH UV RADIATION IS IN THE SUNLIGHT ??

THERE ARE SEVERAL DIFFERENT TYPES OF LIGHT, BUT YOU CAN'T SEE ALL OF THEM. For example, ultraviolet light (UV radiation) can't be seen with the human eye. UV radiation comes from the sun and it's NOT GOOD for humans. You only need a little bit of sunlight (vitamin D). If you're exposed to too much UV radiation from the sun, your skin will BURN and you can even get sick. But smearing on a bit of SUNSCREEN and sitting in the shade helps. While we can't see it, many animal species can see and even use UV light. For example, reindeer use UV light to spot hidden polar bears in the snow. Female butterflies use UV light to find the most beautiful and healthy males to be their mates. And some birds can use UV light to locate TASTY INSECTS and navigate when the sun is obscured by clouds.

HOW DOES IT WORK?

It all begins with the QUESTION: What do you want to measure? Do you already know? GREAT! Now you can GET GOING.



STEP 1.

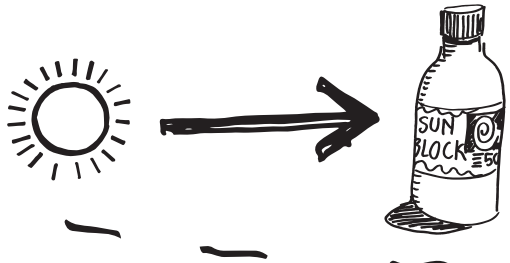
You start by making the MEASURING INSTRUMENT. *What you'll need: Smart Kids Lab / making meters. There you'll find all the information you need to get started.

Only do this experiment with an ADULT!

STEP 2.

Now it's time to go do RESEARCH and experiment. Before you start, think about what you want to investigate in your area and how to go about doing it. For example, if you go to the beach, a lake, or a park for the day, you could investigate how much UV radiation there is before you go back home.

*What you'll need: the Smart Kids Lab / experiments worksheet. This explains how to use your homemade meter to collect data.



STEP 3.

Collect the measurement DATA on the Smart Kids Lab worksheet.

*What you'll need: the Smart Kids Lab / experiments worksheet. You can record your measurements here.

STEP 4.

Go grab the COMPARE-O-METER so you can compare your measurement data to that of others. You'll also find a lot of interesting information here. *For this you'll need: Smart Kids Lab / compare-o-meter worksheet.

STEP 5.

Take a picture of your measurement data and put it on the GREAT DATA MAP. You can find it at smartkidslab.nl.

*What you'll need: You can take a photo with a phone or digital camera. THE GREAT DATA MAP can be found at smartkidslab.nl (in the menu bar).

This project has been co-funded by the European Commission within the Call H2020 ICT2015 Research and Innovation action. The grant agreement number is 688620

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Is there a lot or a little **UV** - radiation in the light ?

SMART KIDS LAB
compare-o-meter

COMPARE YOUR DATA

UV

Snow reflects up to 80% of UV radiation. That means you can get a sunburn extra fast in the snow!

SO PUT ON LOTS OF SUNSCREEN IF YOU'RE OUTSIDE IN SNOWY CONDITIONS!

90% of UV radiation simply passes through light clouds!

We get the most of UV-radiation between 10:00AM and 2:00PM

Sand reflects up to 25% of UV radiation.

not good for you

Too much UV radiation burns your skin, and on sunny days it happens fast!

NOT fun and bad for your skin!

SO PROTECT YOURSELF!

Maybe even as fast as your dinner cooks in the oven!

Nicer than a sunburn

If you stay inside for a whole day, you'll only absorb 10-20% of the UV radiation that people who are outside all day absorb.

But you also need sunlight to make enough vitamin D for your body. It makes you happy!

You get an average of 50% less UV radiation in the shade

hat

long sleeves

try to stand in your own shadow!

At night the UV radiation is at its lowest ... because the sun is down!

(unless of course you fell asleep in a tanning bed... DON'T DO IT!)

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SMART KIDS LAB

making Meters

DISCOVER HOW HEALTHY YOUR NEIGHBORHOOD IS AND WHAT YOU CAN DO TO IMPROVE IT!

Did you know certain wavelengths of SUNLIGHT are invisible to humans? For example, we can't see ultraviolet light (UV radiation). But if you're exposed to UV light for too long, your skin will BURN. Ouch. But how much UV light are you exposed to when it's cloudy outside? Or if you sit the shade?

Make your own UV METER with homemade TEST STRIPS (instead of using your precious skin!)

WHAT DO YOU NEED?

- 2 grams of potassium hexacyanoferrate(III) (find online)
- 6 grams of ammonium iron (III) citrate (online)
- Demineralized water (supermarket)
- 2 plastic bottles
- Wooden or plastic stirring sticks (no metal)
- Watercolor paper
- Spray bottle & face masks
- Small kitchen scale
- Scissors & plastic gloves

WARNING

Potassium hexacyanoferrate and ammonium iron citrate are DANGEROUS substances!

- → Always do this experiment with AN ADULT;
- → DO NOT stir with metal;
- → ALWAYS wear gloves;
- → DO NOT be messy;
- → Work in a VENTILATED space!

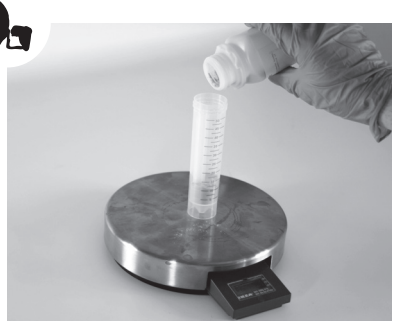
1.

Weigh out 2 grams of potassium hexacyanoferrate(III) and put it in a plastic bottle.

2.

Add 20 ml of cold, demineralized water and stir until the powder is completely dissolved.

3.



Weigh out 6 grams of ammonium iron (III) citrate and put it in the other plastic bottle.

4.

Add 20 ml of cold, demineralized water and stir until the ammonium iron (III) citrate is completely dissolved.

5.

Cut long strips of watercolor paper. These are your test strips.

6.

In a dark place, pour the mixtures together and then put the resulting liquid into your spray bottle.

7.

Put on a facemask and gently spray the mixture onto the strips of paper in a dark place and allow them to dry.

→ LOOK ON THE BACK FOR STEPS 8 AND 9

CONTINUED...

8.

Place a dry test strip in a place where you want to take your measurement and wait exactly 2 minutes. Try this, for example, in the bright sun, partly in the shadow under a tree, under a regular lamp inside, or beside a window.

9.

Rinse the paper well with tap water until no green / yellow spots remain (otherwise it will continue to color and your test won't work!). Allow the paper to dry again.

- Everything that is now the color **BLUE** on the paper has absorbed UV radiation.
- If it is **WHITE** then it has absorbed little or no UV radiation.
- The **DARKER** the blue, the more UV light it has absorbed. Lighter blue has absorbed a little UV.

TIP

Guess what? You've made a kind of photo paper. If you place objects on a larger piece of this paper (instead of using the small strips), you can create beautiful blue and white images with sunlight.

For example, place some drinking glasses, sunglasses, clear plastic foil or wipe off parts of the paper.

Do you have fluid left? Keep it in a dark place!

You can **NO LONGER** use this **SPRAY BOTTLE** for **PLANTS!** Or, if you do, you should rinse the it **VERY WELL** first.

Is there a lot or a little

UV - radiation in the light ?

SMART KIDS LAB
experiments

Step 1 Make 3 UV-METER strips and place them where you want to measure the UV-radiation for exactly 2 minutes. For instance, place the strips outside in the bright sun, in the shade, or inside on the windowsill. Or you could measure on different days (sunny, partly cloudy, very cloudy). Then rinse the strips well with tap water and let them dry.

Step 2 Below, draw the different places where did your UV measurements. Which strip absorbed the most UV radiation do you think?

Step 4 The bluer a strip is, the more UV radiation it has absorbed. Compare the places you measured with the facts on the UV compare-o-meter. Is there a lot or little UV radiation at your measuring spots? Why do you think that is?

MY RESEARCH CONCLUSION:

Step 5 Take a picture of this worksheet & put it on the BIG data map at SMARTKIDSLAB.NL

PLACE A .....

Step 3

When your UV meters are dry, stick them here (cut them so they fit if you need to).
Write where your meter was located.

PLACE B .....

Also glue one of your UV meters here.

PLACE C .....

And here too