**Materials Decathlon - Challenge n°6 - 40’**

**Circular Polarization**

On the desk you have a pile of numbered grey plastic squares, namely polarizing filters. But they are not all alike: some of them are linear polarizers, some are circular ones.

1. Sort into two different piles the two types of polarizer.

You are free to test in any possible way provided that the tests are NOT destructive!

* ***Suggestion1****: watch a PC[[1]](#footnote-1) screen while rotating the filters, for each filter repeat the rotation after having flipped it ( = exchanging upper and lower face).*
* ***Suggestion 2****: put the filters on a mirror or other highly reflective surface. For each filter repeat after flipping upper and lower face.*

**Q1.** Which numbers correspond to ***linear*** polarizers and which ones to **circular**? Fill in the table in the answer sheet and explain which tests you did and what you observed.

1. Take two circular polarizers, put them back to back and rotate them together in front of the PC screen. What do you notice?
2. Keep one of those two polarizers and repeat step 2 with all the other circular polarizers: do you notice any differences?

**Q2.** Are the circular polarizers all alike? If not how many types can you distinguish? How?

1. **Q3.** Are circular polarizers really polarizers? That is to say: is the light coming out of a circular polarizer oscillating on a specific plane (polarization plane)?

To answer this question run the following test:

* Put a circular polarizers on top of a linear one and both of them in front of a polarized light source (such as a PC screen). Rotate the linear one till you find a position producing a complete light extinction (dark!), that means that the light reaching your eye was linearly polarized (due to the linear filter) .
* Now invert the position of the two polarizers: circular directly in front of the PC screen and linear on top of it. Rotate the linear polarizer once again. Can you find a position producing extinction now? And if you flip the circular polarizer? What can you deduce about the light transmitted by the circular polarizer?

1. Put sellotape on a microscope glass longitudinally ( = along the main length) and put the linear polarizer perpendicularly on top. Rotate them together in front of the PC screen and next to them rotate also a circular polarizer till you see the same colour in both systems. From this point on rotate them together with similar angles: which colour do they produce? Is it different?

**Q4.** The circular polarizer is therefore equivalent to ... (What?). But with some differences: which ones? [*Suggestion: see step 4.*]

**☞OUTPUT WANTED : Answer to Q1-Q4 + at least 2 pictures of apparatus and/or detail**

**Answer sheet GROUP N°\_\_\_\_\_\_\_\_\_\_\_**

**Ch.6 --- Circular Polarization**

|  |  |
| --- | --- |
| **Linear polarizers N°** | **Circularpolarizers N°** |
|  |  |

**Q1**

**Q2**

**Q3**

**Q4**

**PICTURES [*Sent by Whatsapp to your group* – *See general instruction to share pictures or files*]**

* **Picture 1 description:**
* **Picture 2 description:**

|  |  |  |
| --- | --- | --- |
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1. If you don’t have a pc use a smartphone screen ***BUT be careful***! Differently from laptops some are linearly polarized, some are not! [↑](#footnote-ref-1)