

# Why do astronauts wear a special combination ?

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**Hypothesis :** “The layers of aluminium found in spacesuits help protect astronauts from extreme space temperatures in space”

**Research and justification :**

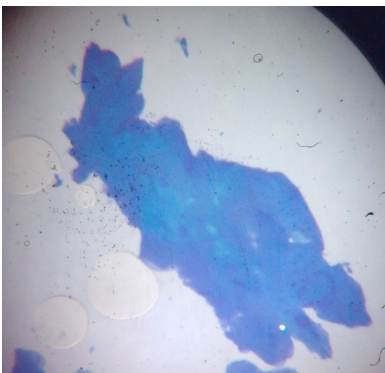
[https://fr.wikipedia.org/wiki/Combinaison\\_spatiale](https://fr.wikipedia.org/wiki/Combinaison_spatiale)

<http://www.astrosurf.com/luxorion/astronautique-combinaison-spatiale3.htm>

We first went on wikipedia in order to know more about a spacesuit. Then we read on the second link that at least 5 layers of aluminium were put inside a spacesuit in order to protect the astronaut from extremely low (down to  $-273^{\circ}\text{C}$ ) and high (up to  $150^{\circ}\text{C}$ ) temperatures in space.

**Protocol and experiment:**

Our protocol consisted of placing human cells (collected from our mouths) on 3 lamellas wrapped in aluminium foil, and 3 that weren't wrapped and putting them in a freezer at  $-11^{\circ}\text{C}$  for 15min, 30min and 45min. At each of these respective times, we took out 1 wrapped lamella, and one that exposed and compared them to each other and another lamella left out in our classroom temperature. We did the same thing with 6 other lamellas (3 wrapped, 3 exposed) but this time put them in high-heat oven rising to  $45^{\circ}\text{C}$  and compared them to the others with a microscope. In order to see them clearly, we put a colorant called methylene blue before placing them under the microscope.



High heated cells on unwrapped lamella vs Normal cells in ambient classroom temperature

**Results and interpretation :**

Unfortunately, we did not find any distinguishable difference between the cells in low, ambient and high temperature, regardless of the aluminium foil. Though for one of the unwrapped lamellas exposed to high temperature, we did notice a slight change: the cells were much bluer than the cells that stayed in ambient temperature. We think that it might have been caused by the evaporation of the water inside the cells therefore making the cells look bluer.

**Conclusion :**

We think that the lack of fruitful results might be caused by the temperatures not being extreme enough ( $-11^{\circ}\text{C}$  in the freezer compared to  $-273^{\circ}\text{C}$  in space) and therefore cannot represent the exact conditions in space. Also, if we have had a bit more time in class, we could have better observed them under the microscope instead of being in a rush.