

MUL+IPLIERS

ACTIVITY 2:

What do we think about clean and polluted air?



This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme Under Grant Agreement No. 101006255.

Cite as:

Tena, E., Solé, C., Couso, D. (2023). Activity 2. What do we think about clean and polluted air?. In Air Pollution. MULTIPIERS project. Teachers' material. UAB, Barcelona

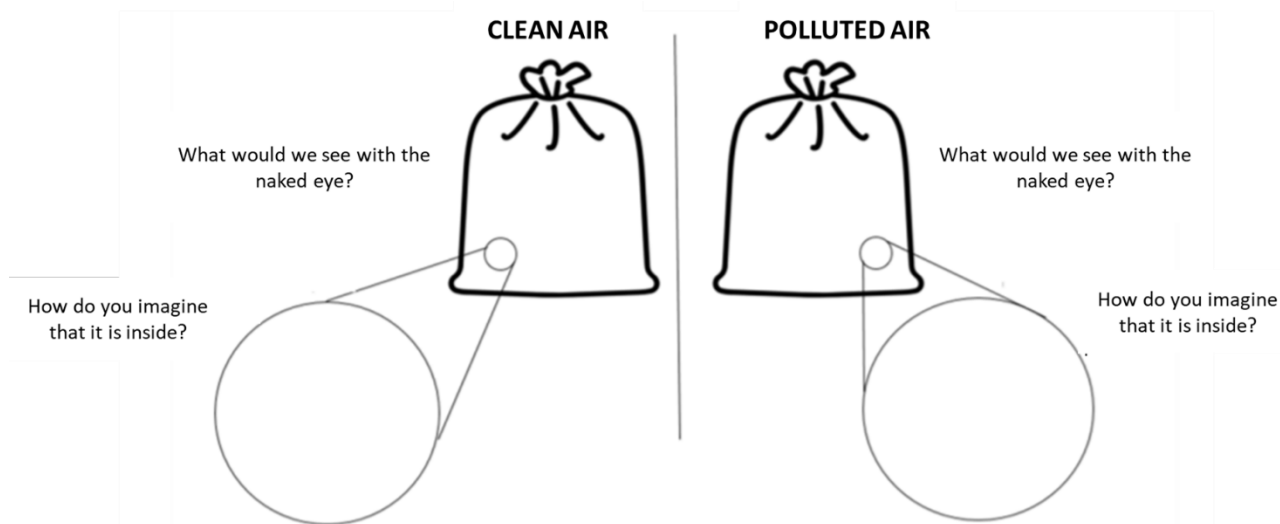


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WHAT DO YOU THINK ABOUT AIR POLLUTION?

1. Imagine that we catch in one transparent bag air from a clean place and, in other transparent bag air from a polluted place. Draw how do you imagine that are both clean and polluted air as seen with naked eye and it inside.



Describe in the following square your drawing about the transparent bags explaining both what you think that it can be seen with naked eye and how do you imagine in it inside.

A large empty square box with a blue border, intended for the student to draw and write their observations and imagination about clean and polluted air.

WHAT IS THE AIM OF THIS ACTIVITY?


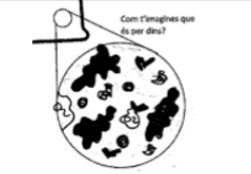
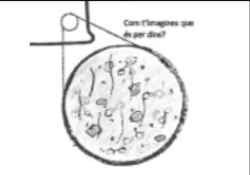
The main aim of this activity is to identify the students' initial and individual ideas related with clean and polluted air.

WHAT ARE WE GOING TO DO?

In this activity, it is important that students can express individually and both drawing and describing how they imagine clean and polluted air using their own representations and vocabulary. It is significant that students draw their ideas at two scales. First at macro level, as if they see the bag with the naked eye; and second, at meso/micro/submicro level, as if they could see it inside.

Some common representation for the phenomena are:

- Most of the students in lower secondary school consider that air could be polluted despite we cannot perceive by senses.
- Students consider polluted air as a single substance.
- They do not consider the components in normal atmosphere (such as N₂ or O₂) as part of the polluted air, but, in some cases, CO₂ is considered a pollutant.
- Most of the students consider not present in normal atmosphere such as inert components related to human activity or pathogens, virus, and bacteria as pollutants, between others.
- In their initial production, students represent polluted air as a semicontinuous substance. This means that in most of the cases, they think of polluted air as small “particles” (in a broad form) embedded in a continuous substance.
- Regarding the scale used, students usually represent polluted air at the mesoscale. This means that in their drawing/explanation includes particles that do or do not have the same characteristics of the substance, which could be seen with a magnifier or a microscope.

Components not present in normal atmosphere		
Pathogens, viruses and bacteria	Inert components related to human activity	Inert components not directly related to human activity
 <p>Com l'imagines que és per dins?</p> <p>“In polluted air there are bacteria”</p>	 <p>Com l'imagines que és per dins?</p> <p>“Smoke and diesel waste”</p>	 <p>Com l'imagines que és per dins?</p> <p>“Mud and dust”</p>

Example of a common student's representation of polluted air as if they could see it inside.

When students finish their productions, it is proposed that student share their individual ideas with their classmates. It is essential to consider that at this moment of the teaching and learning sequence, the teachers' comments should help students to identify and underline similarities and differences between their ideas. At this moment, it is important not specify which are ideas that are scientifically accepted, and which are not. But what it is important is to make explicit that the scientific ideas related to clean and polluted air are going to be built during the following activities.

TO KNOW MORE ABOUT

If you are interested in students' ideas, you can go in deep in Solé, Couso & Hernández (2022); Solé et al. (2020) and Tena & Couso (2021).