

# **SCIENCE PROGRAM AT SCHOOL**

## **“Global Warming of the Planet”**

**Project** Developed with 4th grade of Primary.

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## SCIENCE PROGRAM AT SCHOOL

### “Global Warming of The Planet ”

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The main objective of this project is to make the students aware of the global warming of the planet through experiments in class.

We Will follow these steps:

- 1<sup>st</sup> Discover what they know about the concept of heat, temperature, gases, pressure.
- 2<sup>nd</sup> Reaching hypothesis
- 3<sup>rd</sup> Carry out a lot of experiments.
- 4<sup>th</sup> Check the results of their experiments with their previous hypothesis.

This year we are going to investigate about nature of heat, states of matter (their changes: evaporation, condensation), characteristics and behavior of gases. All of this to understand the global warming of our planet.

This Project is focused on for 4<sup>th</sup> grade of Primary.

#### FIRST SESSION:

1. We Will start this session with a brainstorming about the concept of heat.
2. We will continue with questions to check the previous knowledge of our students about the nature of heat and how much they remember about gases.

Questions: What is the heat?  
Do the gases exit?  
Tell me an example of a gas...

3. We will remember :  
-The cycle of water and the concept of evaporation and condensation.

#### Material:

- Internet
- Notebooks
- Big bowl
- Plastic water
- Syringe
- Earth sphere
- A Candle
- Incense
- Container with two tubes as a way of chimneys

- Air is a gas.
- The different states of matter (solid, liquid and gas) and its molecular behaviour.

Dramatization: For that purpose we dramatize the molecular behaviour of solid (children holding hands), liquid(children separate) and gas (children more separated and shaking themselves).

#### 4.Experiment: "The Hadley Cell"

We are going to start with this experiment to motivate them to think about what it could happen.



Conclusion: The air heats and rises. The smoke of the incense that we put through the tube/chimney with no candle down, tends to come out through the tube/chimney with a candle just down.

#### Children questions and reactions:

- What happens if we put an incense in the tube/chimney with the candle down?
- And what about if we put an incense in both tubes/chimneys as the same time?

5. We show the movement of the cold air of the atmosphere from the poles towards the Earth's warm Equador.  
(We use the school Earth Sphere).

## 6. Experiment: Air pushes the water.

We will put a plastic bottle filled with water upside down into a bowl filled with water too. We will put air with the help of a syringe and a plastic tube. The water of the bowl goes out while the air comes into the bottle.

Conclusions: The air pushes the water.

Gases have no volume and shape and they occupy a space.

## SECOND SESSION:

1. We will start this session by summarizing the last session.

## 2. Experiment: Heat the air. How the heat acts on gases?

A plastic bottle with some water inside will be covered with a balloon empty of air. We will put the bottle in a bowl with a hot water. The balloon will inflate.



3. Notebooks: The children will draw what do they think is inside the balloon before and after the bottle is heated

Conclusions: The air to be heated occupies more space.

Gases increase their volume when are heated and they decrease in volume when cooled.

## Material:

- Internet
- Balloons
- Notebooks
- Plastic bottle
- Bowl with hot water
- Bowl with cold water
- Straws

#### 4. Introducing the thermoscopio, and the concept of heat and temperature.

**Experiment :**Thermoscopio.A plastic bottle with half water and with a straw inside attached to the bottle inlet. When we put our hands touching the bottle air and water is heated because of the heat of our body, then the water comes up though the straw.



#### Conclusions:

- Air is made of gases. Gases behave differently in response to a heat source.
- Temperature is the degree or intensity of heat present in a substance or object.
- Heat seen as a form of energy arising from the random motion of the molecules of bodies, which may be transferred.
- Heat is like a fluid that passes from one object to another one.



### THIRD SESSION:

1. We will start the session by summarizing the last sessions.
2. We will follow the lesson with a video of an Italian coffee machine.

<https://youtu.be/dkp7v9P0Ozg>

Questions: How does this coffee machine work?  
Why does the water rise?

### 3. Pressure introduction

#### **Experiment : “The bottle that pees”**

A plastic bottle with half water with a straw through a hole in the bottle. Also we will cover the bottle with a balloon full of air. At this moment, the water will go up outside through the straw.

The air of the balloon exerts a pressure on and the air of the bottle and this exerts a pressure on the water that makes the water go out through the straw.



#### Children questions and reactions:

-What happens if we cover the hole of the straw? Then, Will the balloon deflate? ( We did it and the balloon didn't deflate)

Conclusions: The balloon exerts a pressure on the air. This air is compressed. This air is more compressed than the air of the atmosphere.

4-Notebooks: The children will draw the bottle with water, the straw and the balloon full of air and the direction of air and water with arrows.

### Material:

- Straws
- Internet
- Balloons
- Notebooks
- Plastic bottle with water
- A straw

#### **FOURH SESSION:**

1. We will start this session by summarizing the last sessions.  
- We will remain the concept of pressure and condensation.

**2. Experiment: "Condensation point".** We will put some ice in a metal cup and will check that the outside walls of the cup starts to become with humidity.



-The dew point is the temperature the air needs to be cooled to (at constant pressure) in order to achieve a relative humidity (RH) of 100 %. At this point the air cannot hold more water in the gas form.

**3. Experiment: "Cloud in a bottle".** Let's create clouds.  
A large plastic bottle of water with hot water at the bottom.  
We will put a piece of burned paper inside.  
We will shake the bottle and the colour of inside will change.  
It becomes white, the cloud.

#### **Material:**

- Bottle of plastic
- Thermometers
- Vinegar
- Sodium bicarbonate
- Two bottles of glass
- A lamp
- Ice
- A metal cup



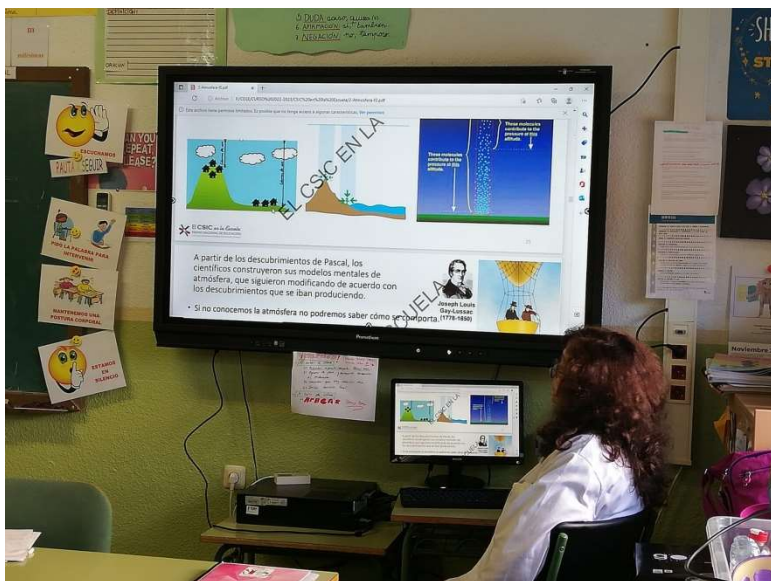
Conclusion: Clouds are made with condensation centers.  
In the bottle there are molecules of water which join to the molecules of the smoke (burned paper), that are the condensation centers.

4. We ask the children what is the coat of the Earth planet.  
The atmosphere.



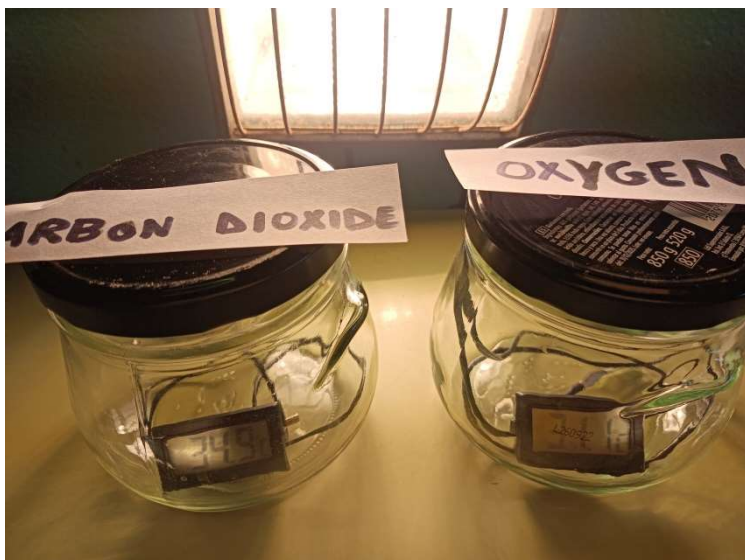


5. We talk about the atmosphere and the different pressures depending on the level in the atmosphere. There is less pressure in high levels, for examples on the top of a mountain, than in low levels like near the sea. (Looking at pictures on the internet).



## 6. Global warming of the planet.

**Experiment :** In a plastic bottle of water we will mix sodium bicarbonate with vinegar (carbon dioxide). We will put the gas produced by this mix in a glass bottle, then it will be closed with its tap. In another glass bottle we will put air from the ambient. In both bottles will be a thermometer and both bottles will be warmed by a lamp. We will check which bottle will be heated faster.



Conclusions: The bottle with carbon dioxide heats faster than the one with normal air.



So, the atmosphere heats faster when is contaminated with carbon dioxide. It is, contamination makes The Earth heat faster, what will carry terrible consequences for our beautiful planet.

#### BIBLIOGRAPHY

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