

# Practical Test Atmosphere

Name \_\_\_\_\_ Country \_\_\_\_\_

## Fog in a jar

- Instruction sheet -

### Background information

Formation of fog, cloud and several other meteorological events share the same physical phenomenon: the condensation of water vapor that happens when water passes from the gaseous to liquid state. During this lab you will simulate the formation of fog in a jar through the creation of suitable conditions.

### Materials

2 glass jars  
1 stick of incense  
1 matchbox  
2 aluminum boxes previously filled with ice  
1 laser pointer  
Cold water  
Warm water

### Procedure

1. Fill jar 1 with cold water (T approx  $10^{\circ}\text{C}$ ) and jar 2 with warm water (T approx  $35^{\circ}\text{C}$ ).
2. Wait for 10 min approx in order to allow that the glass of both jars to come to the same temperature of the surrounding water. This helps you to prevent condensation inside the jars.
3. Measure the water temperature in both jars. Write the results in question 1.
4. Remove 3/4 of the water from both jars.
5. Light the stick of incense and try to put some smoke into jar 1. Blow gently the incense smoke into the jar.
6. Quickly place the aluminum box containing ice on the top of jar.
7. Repeat the same procedure (steps 5 – 6) with jar 2.
8. Carefully observe what happens inside both jars.
9. Use the laser pointer to observe the progress of the phenomenon and try to compare them estimating which one of the two jars produces more fog.

## Fog in a jar

- Worksheet -

### Question 1: 2 point

Write down the temperatures of the water of the two jars:

Jar no.	Temperature °C
1 (cold water)	
2 (warm water)	

### Question 2: 1 point

In most climate areas fog is more common during the cold season; does this experiment help you to understand this phenomenon?

- a) yes
- b) no

### Question 3: 3 points

In your opinion which of the following sentences explain better the role played by the smoke inside the jars (**mark ONE** of the following answers)

- a) Warm up the air inside the jar further
- b) Warm up the water inside the jar further
- c) Give tiny particles that provide surfaces on which water vapor can condense
- d) Give tiny and warm particles that increase the difference in temperature between air and water. This affects the condensation positively.

### Question 4: 4 points

In the atmosphere which one of the following processes, in your opinion and most likely, emits substances that could play the same role of the smoke you use in this lab? (mark **no more than TWO** of the following answers)

- a) The erosion of a river
- b) A volcanic eruption
- c) The respiration of living organisms
- d) Fossil fuels burning
- e) An earthquake

### Question 5: 4 points

Which of the following situations, in your opinion, is more suitable for fog formation? (**mark ONE** of the following answers)

- a) Close to a shoreline there is an upwelling of a deep and cold ocean current. Here the water meets warm air coming from the inland area covered with forest
- b) An hilly area has no vegetation cover since is quite arid, there are only rocks

outcrops facing south forming very warm air masses meeting cool ones coming from the adjacent peaks

- c) A very wide area is covered with snow in the mid of winter season. Here cold air masses meet slightly cool ones coming from an adjacent and dense woods

**Question 6:** 2 points

One of the conditions that helps the formation of fog is the ice presence that decreases the temperature of air inside the jar. Which one of the following conditions could lead to the formation of fog? (**mark ONE** of the following answers)

- a) increasing of air pressure inside the jar
- b) decreasing of air pressure inside the jar
- c) An increase or decrease of the air pressure inside the jar leads to fog formation
- d) An increase of the pressure coupled with heating of the air inside the jar

**Question 7:** 2 points

Which one of the following substances of the atmosphere does NOT act as condensation nucleus? (**mark ONE** of the following answers)

- a) marine aerosol made by waves
- b) carbon dioxide
- c) particles lifted during a sand storm
- d) particles emitted during a forest fire

**Question 8:** 2 points

Mark on the following graph two points that represent the conditions of the water inside the two jars (mark the point 1=cold jar; mark the point 2=warm jar).

