Experiment E-5
Measuring Dew Point

Environmental Science

Objectives

- To understand the concept of dew point.
- To explore different ways of measuring dew point.

Modules and Sensors

- PC + NeuLog™ application
- USB-200 module 
- NUL-203 Temperature logger sensor 
- NUL-245 Dew point logger sensor 

Equipment and Accessories

▪ Metal can
▪ Utility stand
▪ Right angle clamp
▪ Extension clamp

The items above (except for the metal can) are included in the NeuLog Utility accessories, UTL-KIT.

Materials

▪ Paper towels
▪ Ice chips
▪ Plastic spoon
▪ Water at room temperature (to fill half of the can)

Introduction

Relative humidity is the most common way for describing atmospheric moisture, but it does not describe the actual amount of water vapor in the air. Instead, it indicates how close the air is to being saturated. The relative humidity (RH) is the ratio between the amount of water vapor actually in the air and the maximum amount of water vapor required for saturation at that specific temperature (and pressure). When the amount of moisture in the air remains constant and the temperature increases, relative humidity decreases. Dew point temperature is a better indicator of the amount of moisture in the air.

Dew point temperature is defined as the temperature at which dew begins to form. Dew is the water you may find on the grass or on your car early in the morning (on solid surfaces). The water appears due to the condensation of water vapor in the air. The current dew point will always be lower or equal to the current temperature. A high dew point means there is a high amount of moisture in the air. The tropics are characterized by high dew points while desert regions are characterized by low dew points.

The table below relates temperature to human comfort:

Temperature (°C)	**Temperature (°F)**	**Degree of comfort**
20 +	68 +	Oppressive
18	64	Sticky
16	61	Humid
13	55	Comfortable
10	50	Refreshing

In this experiment, students will work both with a temperature and a dew point sensor. They will use the temperature sensor to measure the temperature at which dew is perceived on the surface of a metal can. Then, they will compare this temperature to the dew point temperature value.

Procedure

Experiment setup

1. Set up the experiment as shown in the picture below.

2. Fill the metal can half full with water at room temperature.

3. Lower the temperature probe into the water to about 1 cm from the bottom.

Sensor setup

4. Connect the USB-200 module  to the PC.

5. Check that the temperature  and dew point  logger sensors are connected to the USB-200 module.

Note:

The following application functions are explained in short. It is recommended to practice the NeuLog application functions (as described in the user manual) beforehand.

6. Run the NeuLog application and check that the sensors are identified.

Settings

7. Click on the **Run Experiment** icon  and set the:

   Experiment duration to 5 minutes
   Sampling rate to 10 per second

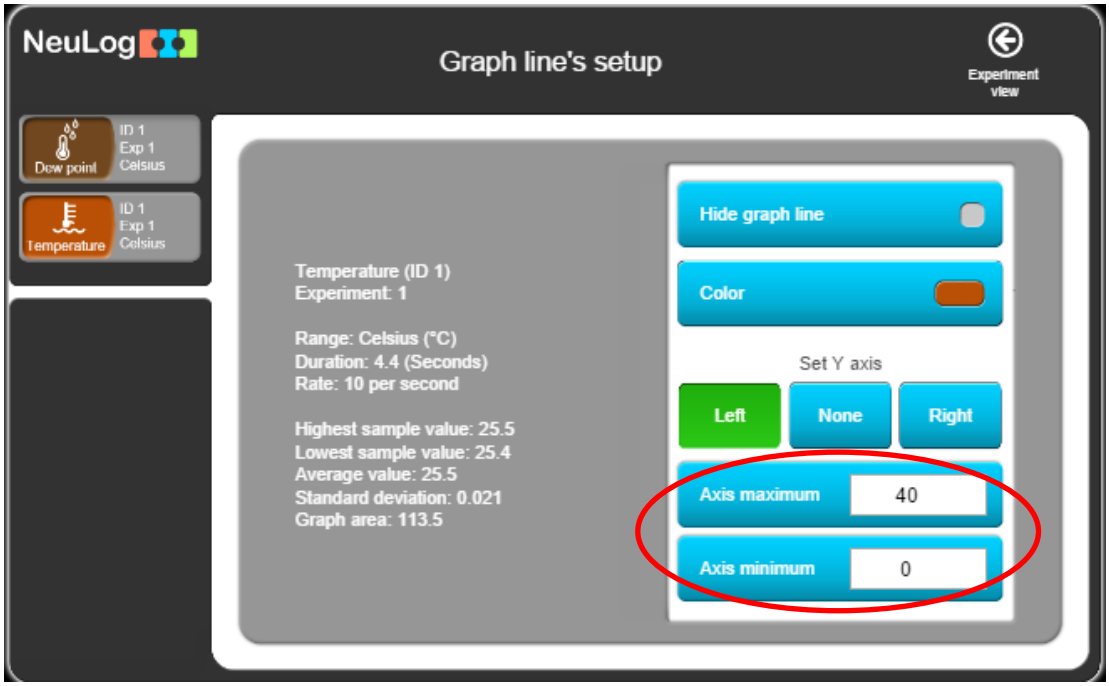
Testing and measurements

8. Click on the **Record** icon  to start the measurement.

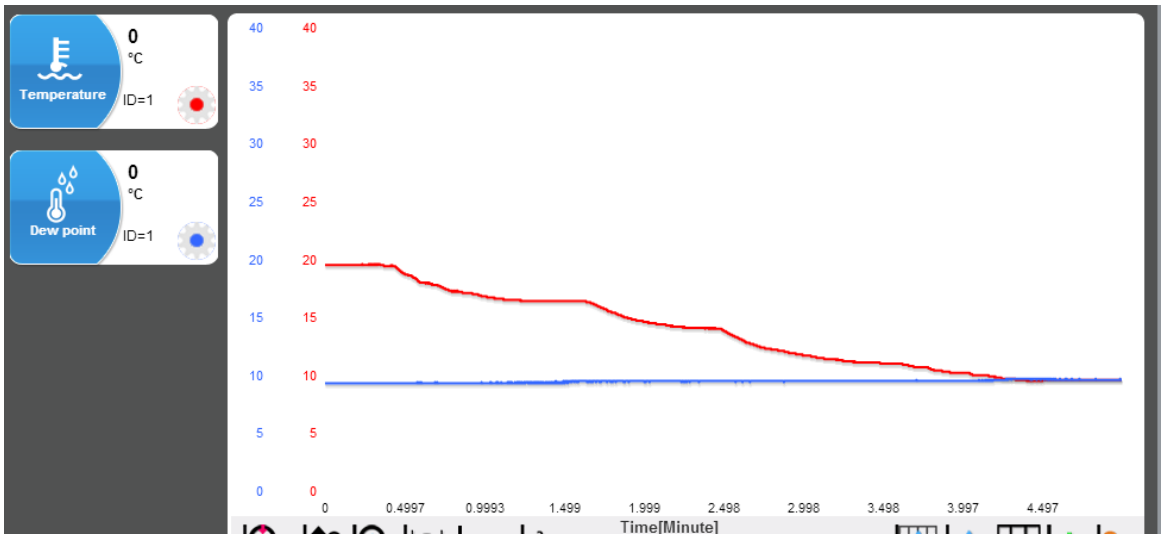
9. Add a spoonful of ice chips to the water and stir. Observe the can to see if water has condensed on the outside.

10. Repeat the last step until you observe condensation. Once this happens, click the stop icon.

11. To facilitate the comparison of the two temperature graphs, set the graph ranges of the two sensors to the same values. Click on the **Experiment Module** box. Insert '0' (^{o}C) in the **Axis minimum** box and '40' (^{o}C) in the **Axis maximum** box for both sensors.



12. Your graph should be similar to the following:



13. Click on the **Export** Icon and then on the **Save value table (.CSV)** button to save your graph.

14. Click on the icon to go back to the graph.

Challenge research

1. Try to change the humidity conditions in the room and repeat the experiment. What should you expect, a higher or lower dew point?

Summary questions

2. If your temperature measurement is not similar to the dew point value in the experiment, propose possible reasons.

3. How did the results change after you conducted the challenge research? Explain.

4. How would you assess the degree of comfort in your room (according to the table in the introduction)? Does it match the measured dew point?