

Experiment E-9 Temperature and Relative Humidity








*Environmental
Science*

Objectives

- To study the relationship between temperature, relative humidity and dew point.
- To follow temperature and relative humidity during a period of 24 hours.

Modules and Sensors

- PC + NeuLog application
- USB-200 module 
- BAT-200 Battery module 
- NUL-203 Temperature logger sensor 
- NUL-207 Relative humidity logger sensor 
- It is also possible to use a NUL-245 Dew point logger sensor  if it is available.

Equipment and Accessories

- | |
|---------------------|
| ▪ Utility stand |
| ▪ Right angle clamp |
| ▪ Extension clamp |
- The items above are included in the NeuLog Utility kit, UTL-KIT.




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. The combination of temperature data and relative humidity data gives us the dew point temperature, which is a better indicator of the amount of moisture in the air than only relative humidity. Dew point temperature is defined as the temperature at which dew begins to form. The higher the dew point, the more moisture is in the air.

In this activity we will measure relative humidity and temperature throughout a period of 24 hours. Relative humidity and temperature data can also be inserted into a dew point calculator.

Procedure

Sensor setup

1. Connect the USB-200 module  to the PC.
2. Check that the temperature sensor  and the relative humidity sensor  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.

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

Settings

4. Click on the **Temperature sensor's Module** box and set the:
Experiment duration to 1 day
Sampling rate to 30 per hour
5. Click on the **Relative humidity sensor's Module** box and set the:
Experiment duration to 1 day
Sampling rate to 30 per hour

Testing and measurements

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



7. Attach the relative humidity sensor to the temperature sensor and connect them to a fully charged battery module.
8. Attach the sensors to the utility stand.
9. Place the utility stand with the sensors outside in the shade.
10. Press on the temperature sensor's push button and then on the relative humidity sensor's push button in order to start the measurement.
11. After one day, connect the sensors back to the USB-200 module.
12. Make sure the sensors module boxes appear on the left side of the screen.

13. Click on the **Load Experiment** icon .

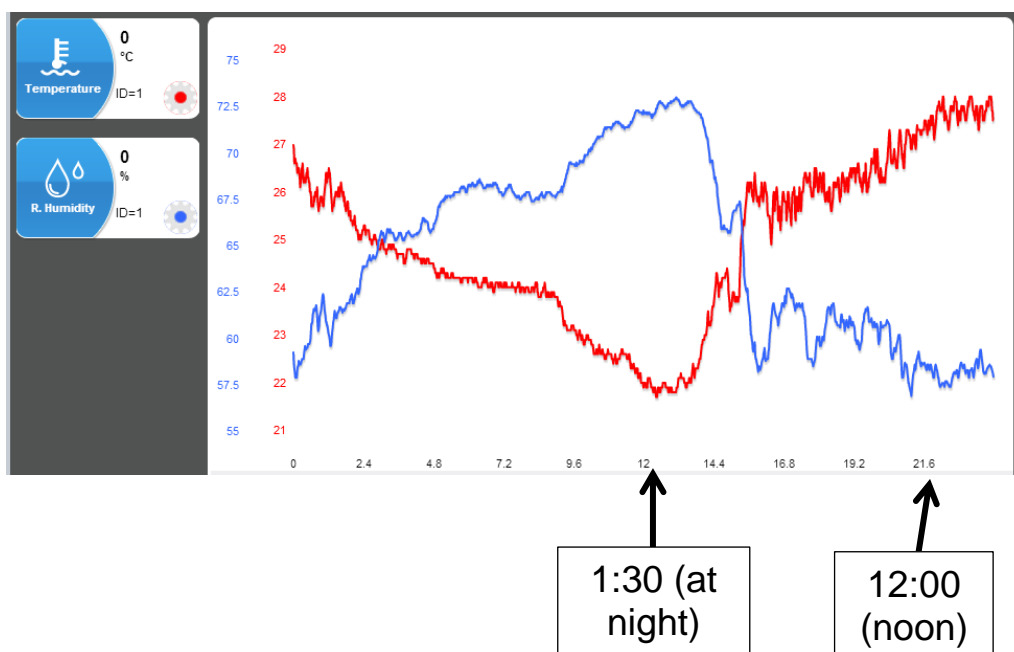
The menu shows a list of stored experiments in the sensor's memory (up to 5).




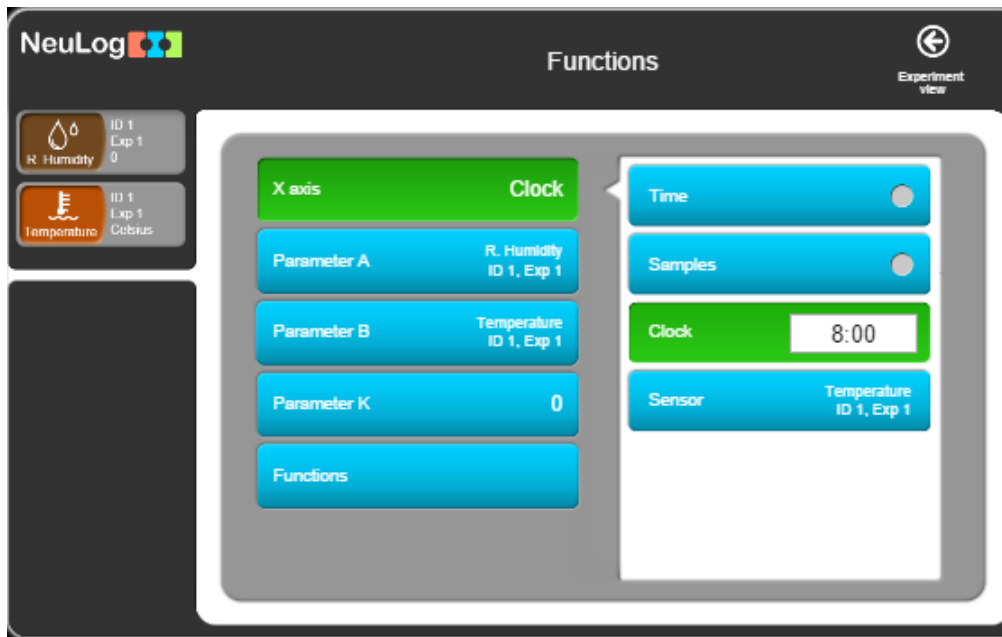
14. Choose the relevant experiment and click on the **Load Experiment** button.


15. Click on the **Zoom fit** icon .

16. Your graph should be similar to the one below.



17. Click on the **Functions** icon  and choose **Clock** for the X axis. Fill in the initial time.



18. Click on the  icon to go back to the graph.
19. Save your data.
20. We can see that at around noon the temperature value is maximal and the relative humidity value is minimal. At night the temperature value is minimal and the relative humidity value is maximal.

Summary questions

1. What do you think is the dew point trend in the sample experiment? What do you think is the dew point trend in your experiment?

Use this website to calculate the dew point in a few points throughout your graph:

<http://andrew.rsmas.miami.edu/bmcnoldy/Humidity.html>

How did the dew point change? How did the amount of moisture in the air change?

2. If the relative humidity graph is not a mirror image of the temperature graph, what can you conclude about the dew point and moisture in the air?