



# Colorimeter Sensor

Product Number ENCOL



## Overview

The Colorimeter is designed to determine the concentration of a solution by analyzing its color intensity. The Colorimeter measures the intensity of light transmitted through a sample at a selected wavelength. This makes the Colorimeter useful for several experiments in Chemistry and Biology.

## Typical experiments



### Chemistry

- Determining the concentration of an unknown colored solution
- Measuring reaction rates
- Chemical equilibrium: Finding a Constant, Kc
- The Lambert-Beer Law



### Biology

- Measurements of glucose synthesis during photosynthesis
- Effect of light on chlorophyll levels in plant leaves
- The effect of enzymes on foodstuffs: Degradation of egg white proteins in the presence of the enzyme – pepsin.
- Concentration of pigment

## How it works

A solution's ability to absorb light waves depends on or is proportional to the concentration of a solution. The Colorimeter shines a colored light through a solution and then records how much light was absorbed by the chemicals in the solution. This allows you to determine the concentration or strength of the solution.

red=625, green=525, blue=470, amber=591

## Sensor specification

Wavelength	Blue (470nm) Green (525nm) Red (625 nm) Amber (591nm)
Transmittance:	0-100%
Feature	Calibration Knob

Note: Sensor cable sold separately

## Connect the sensor

### MiLAEBx™ Desktop

1. Pair your einstein™LabMate™ with your PC, MAC, or Linux machine via Bluetooth, or connect it via the USB cable (found in the einstein™LabMate™ box).
  2. Insert the sensor cable into one of the sensor ports
  3. Launch MiLAEBx
  4. Go to LAB Start an Experiment
- After the logger is connected to the software

The sensor and its ranges appears on the sensor list



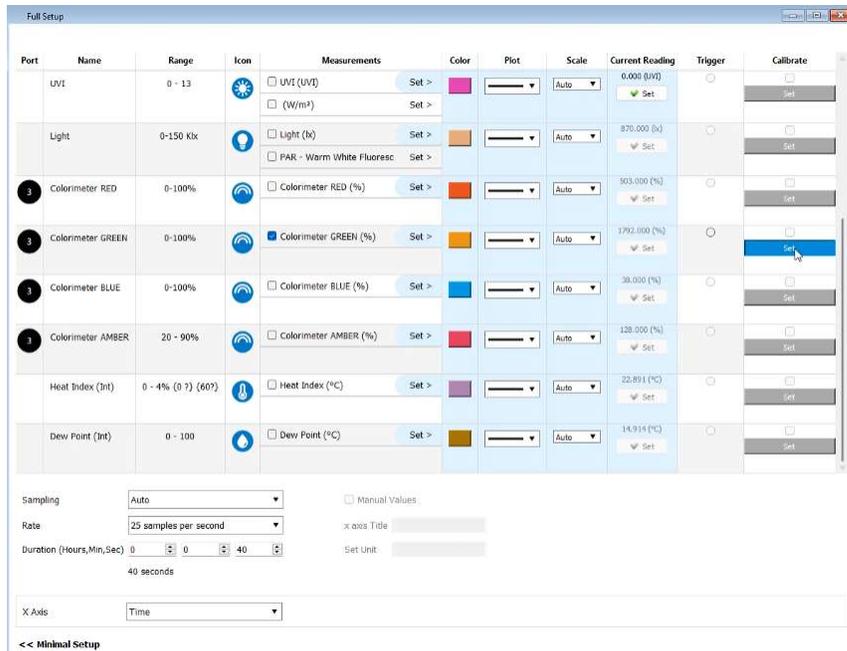
5. Make sure the relevant range is selected  
It is recommended to calibrate the sensor before conducting an experiment.

## Data logging and Calibration

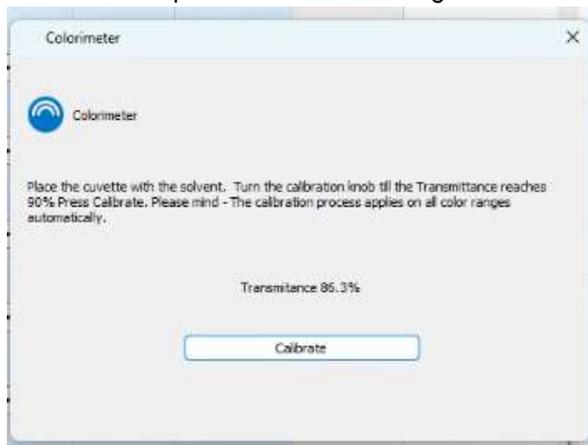
The Colorimeter should be calibrated before any new experiment.=

### MiLAEBx™ Desktop

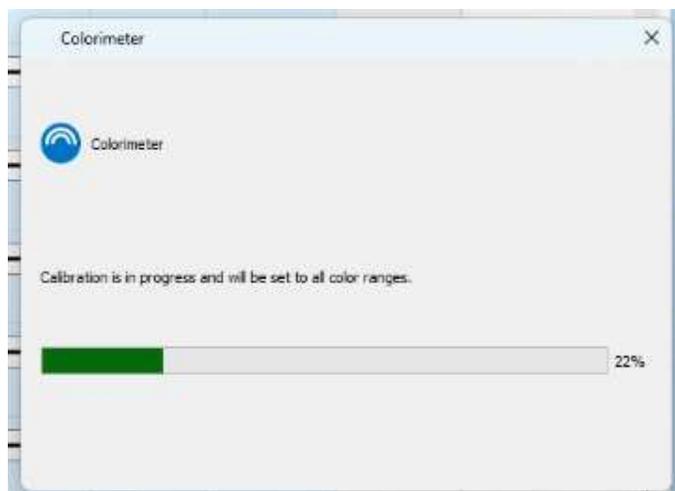
1. After connecting the sensor to your LabMate or to your Einstein device
2. Go to the full setup
3. Click select on one of the color ranges.  
**Important note:** Setting one color calibrates for all colors at the same time.
4. Lift up the rubber cover and insert a cuvette filled with distilled water into the sensor. Tightly close to the rubber cover.
5. Click on Set to enter calibration process.



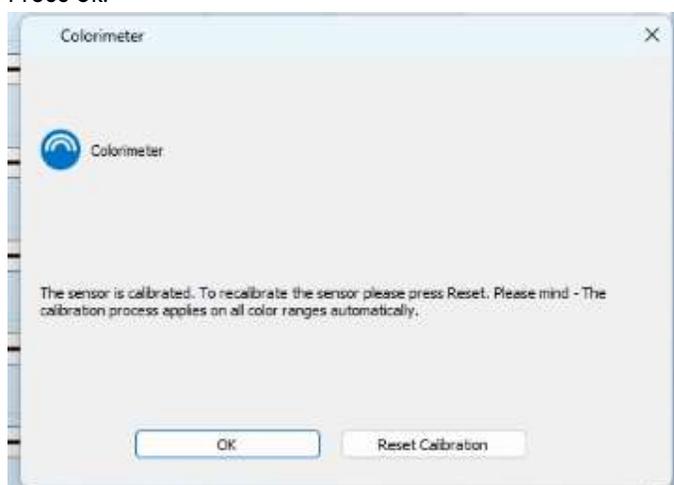
- Turn the calibration knob, located on top of the Colorimeter, until the reading is 90%. (Make sure to find the exact point when the reading turns to 90%).



- When reaching 90% press Calibrate. A calibration process starts and takes several seconds.



8. Press ok.



9. Minimize the setup

10. You are ready to start an experiment

## Example of using the Colorimeter Sensor

### Beers Law

According to Beer's Law, the more concentrated a solution, the less light will be able to pass through it. In this experiment you will use the Colorimeter to demonstrate this principle.

### For this experiment you will need:

- The Colorimeter
- One cuvette
- Distilled water
- Red food coloring

### Set up

1. Prepare 3 mL of distilled water in the beaker

2. Calibrate the Colorimeter as described in Calibration above
3. Select the blue range color
4. Pipette 20ul of red food coloring into the cuvette with the distilled water
5. Blend the solution until the food coloring is spread evenly
6. Insert the cuvette into the Colorimeter
7. Click Run
8. Wait for the reading to stabilize and click Stop

### Experiment

9. Add another 20ul of the red food coloring into the cuvette and repeat the measuring process.
10. Repeat steps 4-9 three more times.
11. Analyze the results. Please notice that the colorimeter output is %T –the percentage of transmittance. In order to calculate the absorbance we should use the equation:

$$A = 2 - \log_{10}(\%T).$$

$$\text{Beer-Lambert Law: } A = \epsilon bc$$

- **Note:** The accuracy of the results may be affected by the solution concentration if it exceeds the sensor's range. If you see any significant deviations, dilute the food coloring with distilled water.

## Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web:

[www.einsteinworld.com/support](http://www.einsteinworld.com/support)

Email: [support@fourieredu.com](mailto:support@fourieredu.com)

## Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.

This warranty does not cover breakage of the product caused by misuse or abuse.

This warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.