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Colorimeter Sensor

Product Number ENCOL-A185

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 a number of experiments in Chemistry and Biology.
The Colorimeter Sensor can be connected to all einstein™ data loggers.

Typical experiments

Chemistry

- Determining the concentration of an unknown 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.

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

Sensor specification

Transmittance:	20%-90%
Accuracy:	±10
Resolution (12-bit):	0.03%
Wavelength:	Blue (480nm) Green (500nm) Red (650 nm)
Cell Volume:	3.5cc
Cell Width:	1 cm
Data Logger Input Type:	Digital
Feature	Calibration Knob

Note: Sensor cable sold separately

Data logging and analysis

MiLAB™

1. Take your einstein™ Tablet or pair your einstein™ LabMate™ with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports via the DT to einstein™ sensor adaptor
3. Launch MiLAB
4. In Launcher View, tap the box marked "Empty" and select Colorimeter from the dropdown list
5. Select the icon next to the sensor (🟢) to enable it for logging

MiLAB™ 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 via the DT to einstein™

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sensor adaptor
3. Insert the sensor cable into one of the sensor ports
4. Launch MiLAB
5. Scroll down to the box marked "Empty" and select Colorimeter from the dropdown list
6. Click Full Setup, located at the bottom of the Current Setup Summary window to program the data logger's sample rate, number of samples, units of measurement, and other options
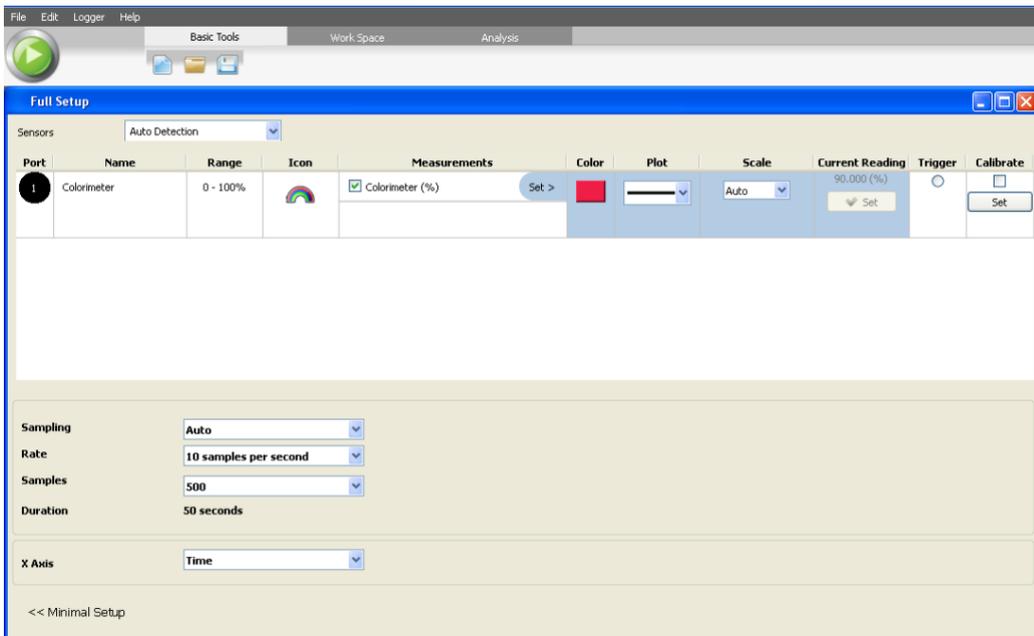
7. Click the Run button ( )on the main toolbar of the Launcher View to start logging

Calibration

The Colorimeter should be recalibrated before any new experiment, or when changing colors.
To calibrate:
1. Insert one of the three filters into the sensor (the one you want to use).
2. Lift up the rubber cover and insert a cuvette filled with distilled water into the sensor. Tightly close the rubber cover.
3. Click Run ( )
4. 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%).

Experiment set up

The Colorimeter comes with:

*   3 colored slides

*   Cuvettes and cuvette caps

*   DT-to-einstein™ sensor adaptor

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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

1. Prepare 3 mL of distilled water in the beaker
2. Calibrate the Colorimeter as described in Calibration above
3. Insert the blue filter into the Colorimeter
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
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 :
    $A = 2 - log_{10}(\%T)$.   Beer-Lambert Law: $A =$εbc

- **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
Email: 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.

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