

Colorimeter Sensor

DT185A



The Colorimeter sensor can be connected to the Nova5000, MultiLogPRO or TriLink data loggers.

The Colorimeter sensor is designed to determine the concentration of a solution by analyzing its color intensity. Colorimeter measures the intensity light transmitted through a sample at a selected wavelength.

Colorimeter is ideal for use in a wide range of experiments in Biology and Chemistry and is supplied with three color-filter slides and fifteen cuvettes.

Typical Experiments

- Determining the concentration of an unknown solution
- Measuring reaction rates
- Measurements of glucose synthesis during photosynthesis
- Effect of light on chlorophyll levels in plant leaves
- The effect of enzymes on food stuff: Degradation of egg white proteins in the presence of the enzyme – pepsin
- The Lambert-Beer Law
- Chemical equilibrium: Finding a Constant, K_c

How it Works

White light from an LED light source passes through a color filter and then through a cuvette containing a sample solution as shown in Figure 1. Some of the incoming light is absorbed by the solution. The intensity of the light passing through the solution is measured by a photodiode (at the left side of the cuvette in Figure 1).

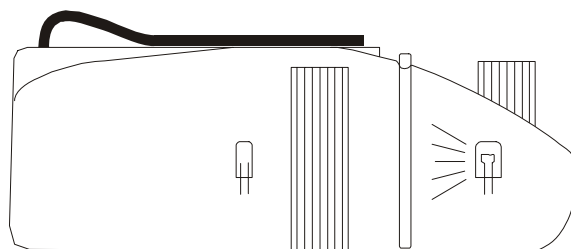


Figure 1: Colorimeter side-view

Sensor Specification

Transmittance:	20% - 90%
Resolution (12-bit):	0.03 %
Wavelengths:	Blue (480 nm) Green (500 nm) Red (650 nm)
Cell Volume:	3.5 cc
Cell Width:	1 cm
Feature:	Calibration knob

Technical Notes

The Colorimeter should be recalibrated before any new colorimetric experiment, or when the color changes during an experiment.

Equipment List

Colorimeter, color-filter slides, cuvettes & cuvette's caps	DT185A
Colorimeter sensor only	DT185
Color-filter slides only	11004
Cuvette only	10828
Cuvette's cap	10829

Equipment Setup

1. Insert the color slide into the slide holder. See Figure 2 below.
2. Fill one cuvette with distilled water (for calibration) or colored solution.
3. Close the cuvette with the cap.
4. Insert the cuvette into the cuvette holder. See Figure 3 below.

5. Close tightly the lid of the cuvette holder. See Figure 4 below.
6. Connect the Colorimeter to the data logger.



Figure 2



Figure 3



Figure 4

How to Choose the Right Wavelength

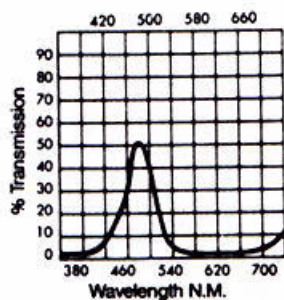
The Colorimeter comes with three color filters: **Blue (480 nm)**, **Green (500 nm)** and **Red (650 nm)**.

Directions for most colorimetric experiments indicate a recommended wavelength. Use the closest of the three filters. Even if the color is somewhat different, a Beer's Law curve can usually be obtained at almost any wavelength in the vicinity of the recommended wavelength.

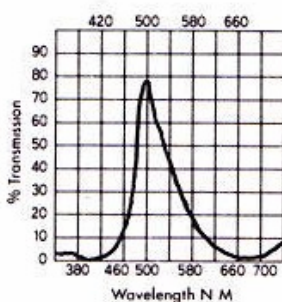
One of the following ways can also be used in order to decide which of the three colors to use:

1. Look at the color of the solution. Remember that the color of a solution is the color of light that passes through it.
2. Another quick method is to place a cuvette containing the solution in question in the Colorimeter and check to see which of the three filters yields the lowest transmittance.

Filters Transmission Curves



Blue Filter



Green Filter



Red Filter

Calibration

1. To calibrate to 100% transmission, insert one of the three filters and a cuvette filled with distilled water into the cuvette holder. Tightly close the lid.
2. Start recording.
3. Turn the calibration knob, on top of the Colorimeter, until the reading is 100%.

Using the Colorimeter Sensor with your Data Logger and MultiLab Software

1. Launch the MultiLab software.
2. Connect the Colorimeter sensor to the data logger's sensor input (starting from I/O-1). The sensor is automatically recognized by the MultiLab software.
3. Click **Setup** on the main toolbar and program the data logger's sample rate and number of samples. Click **Run** on the main toolbar to start the measurement.

An Example of using the Colorimeter Sensor

Beer's Law

The amount of light penetrating a solution is known as transmittance, expressed as the ratio between the intensity of the transmitted light. The relationship between the absorbance of the light, A , and the transmittance, T , is:

$$A = \log\left(\frac{1}{T}\right) = -\log T$$

T – Transmittance as a number between 0 and 1 ($\frac{T\%}{100}$).

In this experiment, we follow the behavior of the linear absorption increase of CuSO_4 with increasing concentration in order to determine the value of the constant k which appears in Beer's law: $A = k \cdot C$ (A is the absorbance, k is a proportionally constant,

C the molar concentration). We do this by measuring the transmitted light while the concentration changes. See Figure 5 below. Every sample represents a new and higher concentration. Using the **Functions** tool from the **Analysis Wizard** in MultiLab as well as the measured transmittance, the Beer's Law graph can be displayed. See Figure 6 below.

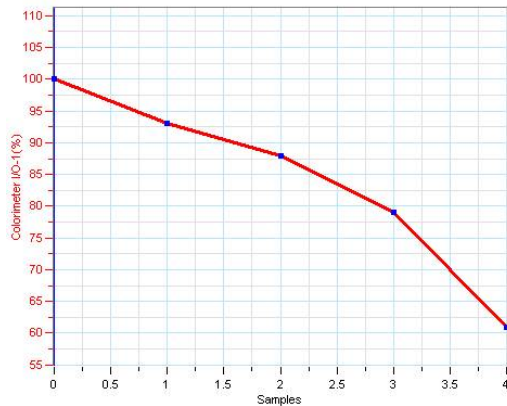


Figure 5: Transmittance vs. Sample (Concentration)

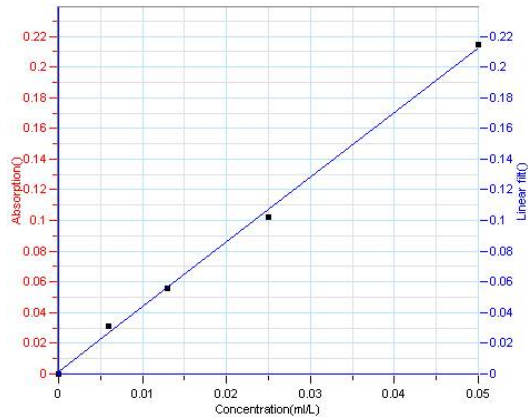


Figure 6: Absorbance vs. Concentration

Technical Support

Please contact Fourier technical support as follows:

Web: http://www.fourier-sys.com/support_support.html

Email: support@fourier-sys.com

Consult the FAQs before contacting technical support:

http://www.fourier-sys.com/support_faq.html

Copyright and Warranty

All standard Fourier Systems sensors carry a one-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.