About the Product

The colorimeter simultaneously measures the absorbance and transmittance of six different wavelengths. The sensor can be used to study Beer’s law (absorbance versus concentration), enzyme activity, photosynthesis, and the rates of chemical reactions (absorbance versus time). The colorimeter can also be used for the chemical analysis of water samples using ezSample Snap Vial test kits.

The sensor also functions as a turbidimeter for water quality analysis. Rather than measuring transmitted light, the turbidity sensor measures light scattered at a 90 degree angle from the sample. Turbidity level (cloudiness) of water samples is measured in nephelometric turbidity units (NTU).

What’s Included

- Wireless Colorimeter and Turbidity Sensor
- 2× Cuvette Rack
- 4× Cuvette with Cap, smooth
- 6× Cuvette with Cap, lined
- Ampoule Cap
- 100 NTU Calibration Solution
- Micro USB Cable
- 2× Label, 100 NTU Cuvette (not shown)
- 2× Label, 100 NTU Expiration (not shown)

Required Items

- SPARKvue or PASCO Capstone Software
  PASCO software is required for data collection and analysis.

Required Items for Water Quality Measurements

- ezSample Snap Vial Test Kit
  Chemical analysis of water samples requires an ezSample kit for the chemical being tested. Kits are available for testing Ammonia, Chlorine, Iron, Phosphate, and Nitrate. Search for "ezSample" at pasco.com to purchase the kits.
Getting Started

This section contains tasks that should be performed before using the device in the classroom.

Charge the Battery

The Wireless Colorimeter and Turbidity Sensor contains a rechargeable battery that lasts an entire school day when fully charged. Charge the battery before using the Wireless Colorimeter and Turbidity Sensor for the first time since it is not shipped with a full charge.

To charge the battery, connect the sensor to a USB wall charger or powered USB port using the USB cable. The battery status light will be solid yellow while the battery is charging. The light will change to solid green when the battery is fully charged.

Install or Update Software

The latest update of PASCO Capstone or SPARKvue is required to use the Wireless Colorimeter and Turbidity Sensor. Download the software at the locations provided. If the software is already installed, check for an update using the provided instructions.

Windows and Mac Computers

Download: Go to pasco.com/sparkvue then click Downloads.

Update: Click Help then select Check for updates.

Mobile Devices and Chromebooks

Search for SPARKvue in your device’s app store. SPARKvue will automatically install future updates.

Check for a Firmware Update

It is important to update the sensor firmware to the latest version to access the latest features and bug fixes. Sensor firmware is installed using SPARKvue or PASCO Capstone. Connect the sensor to SPARKvue or PASCO Capstone to check for a firmware update.

Windows and Mac Computers

Download: Go to pasco.com/capstone then click Downloads.

Update: Click Help then select Check for updates.

Check if a notification appears that indicates a firmware update is available, click Yes to install the update. If a notification does not appear, the firmware is up to date.
Using the Colorimeter

Use the colorimeter to measure the absorbance and transmittance of six different wavelengths.

Step 1: Prepare Solutions for Analysis

When preparing solutions for analysis:

- Use the lined cuvettes.
- Handle the cuvettes by the lined sides to avoid getting fingerprints on the smooth sides.
- Fill cuvettes ¾ full with the test solution and cap the cuvette.
- Clean the smooth sides of the cuvette using a lint-free wipe before inserting it into the test chamber.

Step 2: Prepare a Blank Calibration Cuvette

Fill one lined cuvette ¾ full with the solvent used to prepare the test solutions. The solvent is used to calibrate the colorimeter.

Step 3: Set Up Data Collection

SPARKvue
1. Turn on the Wireless Colorimeter and Turbidity sensor.
2. Open SPARKvue then click Sensor Data.
3. Select the Colorimeter that matches the device ID.
4. Select a Quick Start Experiment.
   - Absorbance and Transmittance
     Measure absorbance and transmittance of a solution at six different wavelengths on a bar meter display.
   - Beer's Law
     Plot absorbance versus concentration of known solutions to determine the unknown concentration of a solution.

PASCO Capstone
1. Turn on the Wireless Colorimeter and Turbidity sensor.
2. Open Capstone then click Hardware Setup.
3. Select the Colorimeter that matches the device ID.

Note: You may be prompted to calibrate the sensor. If you want to calibrate now, click Calibrate and proceed to the Calibrate the Sensor section. Otherwise, click Cancel.

4. Click Hardware Setup to close the panel.
5. Select a Quick Start Experiment.
   - Absorbance and Transmittance
     Measure absorbance and transmittance of a solution at six different wavelengths on a bar meter display.
   - Beer's Law
     Plot absorbance versus concentration of known solutions to determine the unknown concentration of a solution.

Step 4: Calibrate the Sensor

SPARKvue
1. Click Hardware Setup then click for the Wireless Colorimeter.

Note: You may be prompted to calibrate the sensor. Click Calibrate, if prompted.

2. Insert the blank calibration cuvette into the Colorimeter with the smooth side facing the sensor and close the cover.
3. Click Calibrate. A green check will indicate that the colorimeter is calibrated.
4. Click Done.
5. Close Hardware Setup.

PASCO Capstone
1. Click Calibration.
2. Select Wireless Colorimeter from the list then click Next.
3. Insert the blank calibration cuvette into the Colorimeter with the smooth side facing the sensor and close the cover.
4. Click Calibrate. A green check will indicate that the colorimeter is calibrated.
5. Click Finish.
6. Click Calibration to close the panel.

Step 5: Collect Data (Absorbance and Transmittance)

SPARKvue
1. Insert a cuvette containing your test sample with the smooth side facing the sensor and close the cover.
2. Click Start to begin data collection.
3. Click Stop to end data collection.
4. Repeat the steps for additional test samples.

PASCO Capstone
1. Insert a cuvette containing your test sample with the smooth side facing the sensor and close the cover.
2. Click Record to begin data collection.
3. Click Stop to end data collection.
4. Repeat the steps for additional test samples.

Step 5: Collect Data (Beer's Law)

SPARKvue
1. Click Start to begin data collection.
2. Insert a cuvette containing a solution of known concentration with the smooth side facing the sensor and close the cover.
3. Enter the known concentration in the table.
4. Click Keep to record the Absorbance measurement.
5. Repeat steps 2-4 for each known solution.
6. Click Stop to end data collection.

PASCO Capstone
1. Click Preview to begin data collection.
2. Insert a cuvette containing a solution of known concentration with the smooth side facing the sensor and close the cover.
3. Enter the known concentration in the table.
4. Click Keep Sample to record the Absorbance measurement.
5. Repeat steps 2-4 for each known solution.
6. Click Stop to end data collection.
Using the Water Quality Colorimeter

Use the colorimeter to perform a chemical analysis of water samples using ezSample Snap Vial test kits.

Step 1: Prepare Samples for Analysis

ezSample Snap Vial test kits can be used to test for concentrations of Ammonia, Chlorine, Iron, Phosphate, and Nitrate. Refer to the documentation for the ezSample Snap Vial Kit for instructions on how to prepare the samples. When preparing the samples:

- Clean the ampoule using a lint-free wipe before inserting it into the test chamber.
- Handle the ampoules by the tip to avoid getting fingerprints on the ampoule body.
- Cover the ampoule in the test chamber with the Ampoule Cap to keep out ambient light.

![Figure 1. Ampoule cap covering an ezSample Snap Vial ampoule inserted into the test chamber.](image)

Step 2: Set Up Data Collection

**SPARKvue**

1. Turn on the Wireless Colorimeter and Turbidity sensor.
2. Open SPARKvue then click Sensor Data.
3. Select the Colorimeter that matches the device ID.
4. Deselect the default measurement then select a chemical to measure.

**Note:** You may need to scroll down to see the additional measurements.

5. Under Templates, select Digits.

**PASCO Capstone**

1. Turn on the Wireless Colorimeter and Turbidity sensor.
2. Open Capstone then click Hardware Setup.
3. Select the Colorimeter that matches the device ID.

**Note:** You may be prompted to calibrate the sensor. If you want to calibrate now, click Calibrate and proceed to the Calibrate the Sensor instructions. Otherwise, click Cancel.

4. Click Data Summary.

Step 3: Calibrate the Sensor

**SPARKvue**

1. Click Hardware Setup then click Configure Sensor for the Wireless Colorimeter.

**Note:** You may be prompted to calibrate the sensor. Click Calibrate, if prompted.

2. Insert the calibration ampoule included with the ezSample Kit into the Colorimeter and cover with the Ampoule Cap.
3. Click Calibrate. A green check will indicate that the colorimeter is calibrated.
4. Click Done.
5. Close Hardware Setup.

**PASCO Capstone**

1. Click Calibration.
2. Select Wireless Colorimeter from the list then click Next.
3. Insert the calibration ampoule included with the ezSample Kit into the Colorimeter and cover with the Ampoule Cap.
4. Click Calibrate. A green check will indicate that the colorimeter is calibrated.
5. Click Finish.
6. Click Calibration to close the panel.

Step 4: Collect Data

**SPARKvue**

1. Insert an ampoule containing your a sample and cover with the Ampoule Cap.
2. Click Start to begin data collection.
3. Click Stop to end data collection.
4. Repeat the steps for additional test samples.

**PASCO Capstone**

1. Insert an ampoule containing a test sample and cover with the Ampoule Cap.
2. Click Record to begin data collection.
3. Click Stop to end data collection.
4. Repeat the steps for additional test samples.
Using the Turbidity Sensor

Use the Turbidity sensor to measure the turbidity level (cloudiness) of a water sample.

**Step 1: Prepare Solutions for Analysis**

When preparing solutions for analysis:
- Use the smooth cuvettes that do not have lines.
- Fill cuvettes ¾ full with the test solution and cap the cuvette.
- Clean the smooth sides of the cuvette using a lint-free wipe before inserting it into the test chamber.

**Step 2: Prepare a Blank Calibration Cuvette**

Deionized water is used for the first calibration point. Fill one smooth cuvette ¾ full with deionized water and cap the cuvette.

**Step 3: Prepare a 100 NTU Calibration Cuvette**

The 100 NTU solution is used for the second calibration point.

1. Fill one smooth cuvette ¾ full with the 100 NTU solution and cap the cuvette.
2. Place a 100 NTU cuvette label over the cuvette cap as shown in the figure.
3. Place an expiration date label on the 100 NTU Cuvette label.

**Note:** The 100 NTU standard sample should provide accurate results (±7%) up to the expiration date.

**Step 4: Set Up Data Collection**

1. Turn on the Wireless Colorimeter and Turbidity sensor.
2. Open SPARKvue then click **Sensor Data**.
3. Select the Colorimeter that matches the device ID.
4. Toggle the **Wireless Turbidity Sensor** switch from disable to enable.

**Note:** You may need to scroll down the list of measurements to see the sensor.

5. Under **Templates**, select **Digits**.

**Step 5: Calibrate the Sensor**

1. Click **Hardware Setup** then click **for the Wireless Turbidity Sensor**.

**Note:** You may be prompted to calibrate the sensor. If so, click **Calibrate**.

2. Insert the blank calibration cuvette into the test chamber and close the cover.
3. Click **Calibrate** in item 3. A green check will indicate that calibration is complete.
4. Insert the 100 NTU Standard cuvette in the test chamber with the arrow pointing toward the Turbidity sensor and close the cover.
5. Click **Calibrate** in item 4. A green check will indicate that calibration is complete.
6. Click **Done**.
7. Close **Hardware Setup**.

**Step 6: Collect Data**

1. Insert a cuvette containing a test sample in the test chamber and close the cover.
2. Click **Start** to begin data collection.
3. Click **Stop** to end data collection.
4. Repeat the steps for additional test samples.
Experiments
Print-ready experiment worksheets are available to download from the PASCO website. Go to pasco.com/freelabs and enter PS-3215 in the Part No. field.

Software Help
Additional information on how to use the Wireless Colorimeter and Turbidity Sensor with SPARKvue and Capstone can be found in the SPARKvue and PASCO Capstone Help. The help can be accessed within the software or online.

SPARKvue
Software: Click then select Help.

Online: pasco.com/help/sparkvue

PASCO Capstone
Software: In the menu bar, click Help then select PASCO Capstone Help.

Online: pasco.com/help/capstone

Additional Information
Visit the product web page at pasco.com/product/ps-3215 for additional information including:
- Specifications
- Buying Guide (Accessories, Replacement Parts)
- Experiments
- Documents (Knowledge Base, Safety Sheets)

Technical Support
Need more help? Our knowledgeable and friendly Technical Support staff is ready to provide assistance with this or any other PASCO product.

Phone 1-800-772-8700 (Option 4)
+1 916 462 8384

Online pasco.com/support

Warranty, Copyright, and Trademarks
Limited Warranty
For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

Copyright
This document is copyrighted with all rights reserved. Permission is granted to non-profit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited.

Trademarks
PASCO and PASCO scientific are trademarks or registered trademarks of PASCO scientific, in the United States and/or in other countries. All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of, their respective owners. For more information visit www.pasco.com/legal.

Product End of Life Disposal Instructions
This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

FCC Statement
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CE Statement
This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.

Battery Disposal Instructions
Batteries contain chemicals that, if released, may affect the environment and human health. Batteries should be collected separately for recycling and recycled at a local hazardous material disposal location adhering to your country and local government regulations. To find out where you can drop off your waste batteries for recycling, please contact your local waste disposal service, or the product representative. The battery used in this product is marked with the International symbols to indicate the need for the separate collection and recycling of batteries.