

Vernier Flash Photolysis Spectrometer

(Order Code: VSP-FP)



The Vernier Flash Photolysis Spectrometer is an absorption spectrometer that can be used to demonstrate the fundamental principles of chemical kinetics and photochemistry to undergraduate chemistry students.

What is included with the Vernier Flash Photolysis Spectrometer?

- Spectrometer
- AC power supply
- Fluorescence quartz cuvette
- USB cable
- 600 nm filter (10 nm FWHM) in filter housing
- Empty filter housing

Software Requirements

Free Flash Photolysis Spectrometer Software is available at www.vernier.com/vsp-fp

To set up the software, download the file, unzip it, and then run the setup application.

The Vernier Flash Photolysis Spectrometer Software collects the signal waveform from the photodetector. Subsequent data processing, such as conversion of the acquired voltage waveform into temporal profile of ΔA and fitting the ΔA profile to an appropriate function in order to extract the rate, can be done by importing the data as a .csv (comma delimited values) file into *Logger Pro* or Microsoft[®] Excel[®].

Reference Manual and Sample Experiments

The complete reference manual is available as a free download at www.vernier.com/vsp-fp

The reference manual contains three sample experiments:

- Isomerization of Mercury Dithizonate
- Base Catalysis of the cis-trans Isomerization of Congo Red
- Determination of the Activation Energy of the Thermal Back Reaction of One Spiropyran in Toluene

Safety

The Vernier Flash Photolysis Spectrometer is designed and manufactured for kinetic analysis of chemical specimens by means of transient absorption spectrometry. It is not sold, nor intended for, nor should ever be used for any other purpose. The product should be used solely in accordance with the instructions provided.

- Use a compliant surge protector when exposing equipment to voltage. Failure to do so may result in damaging the unit.
- Do not use this equipment in or near water.
- Use extreme caution in handling the cuvette when it is filled with liquid. Never fill or refill the cuvette when it is in the sample holder. Failure to use a cuvette with a dry outer surface or a cuvette that is leaking liquid can result in the flash housing to malfunction or short.
- This system is designed to work optimally at room temperature or an approximation of room temperature.
- Do not disassemble the spectrometer case. Doing so may result in damaging the excitation light source and electric shock.
- If the spectrometer does not appear to be functioning properly do not attempt to repair it yourself. Please contact the Vernier technical support for assistance.

NOTE: Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind.

Using the Vernier Flash Photolysis Spectrometer

1. Ensure that the Flash Photolysis Spectrometer Software is installed on your computer before using the Vernier Flash Photolysis Spectrometer.
2. Connect the AC power supply to the spectrometer.
3. Connect the spectrometer to a powered USB port on the computer or a powered USB hub.
4. Turn the power switch to the On position.
5. Start the Flash Photolysis Spectrometer Software on your computer. The software includes the following components:
 - Flash period: Exposure time of the sample to the xenon flash lamp
 - Time window: Duration of experiment
 - Averages: Number of scans averaged before displaying kinetic trace
 - PD level: Voltage reading on the photodiode—the PD level should read approximately 2.5 V with no filter and no sample
 - Experiment mode: Absorption or Emission
 - Run: Starts data collection
 - Save: Saves current data as a .csv file that can be imported into *Logger Pro* or Excel for data analysis
 - Exit: Closes the program
6. Select the appropriate filter for your experiment. If you are using a third party filter, ensure that the filter is inside the filter housing.
7. Insert the filter housing into its slot on the instrument. The voltage reading should drop by ~1 V.

8. Fill the cuvette with the sample, and insert the cuvette into the instrument. The voltage reading should drop another few millivolts.
9. Ensure that all data-collection parameters are set appropriately for the experiment.
10. Click Run to collect data.
11. Click Save to save the data as a .csv file. The file can now be imported into Logger *Pro* or Excel for data analysis.

Data Analysis in Logger *Pro*

1. Make sure you have saved the data file in the Flash Photolysis Spectrometer Software.
2. Open Logger *Pro*.
3. Choose Import From ► CSV... from the File menu.
4. Select your data file and click Open.
5. The data should be imported and ready to analyze.

Optical Filters

The interference filter selects the wavelength monitored by the photodiode. An interference filter is included with Vernier Flash Photolysis Spectrometer. An empty filter housing is also included that will fit a third party filter. Additional filters can be purchased from any filter company, such as Alluxa or Edmund Optics. The size that fits the housing is 12.5 mm (OD), 9.0 mm (ID). Insert the filter into the filter housing before use.

Photodiode Battery Replacement

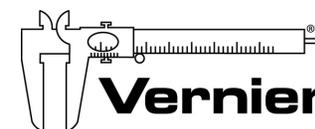
There is a user-replaceable, 12 V battery powering the photodiode that can be accessed by removing the battery compartment lid on the side of the housing. If the PD level registers 0 V, it may be necessary to replace this battery (size 23A, 12 V). You will need a 1/16" hex wrench to unscrew the two screws on the side of the instrument. There is a battery holder inside marked with a + for proper battery orientation.

Specifications

Dimensions	8" × 8" (20.3 cm × 20.3 cm)
Weight	10 lbs (4.5 kg)
Power supply	AC adapter (included)
Light sources	Xenon flash lamp (pump), white light LED (probe)
Detector	Photodiode
Wavelength range	450–750 nm
Temporal resolution	100 μs
Minimum time window	15 ms

Warranty

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty covers use by educational institutions only. This warranty does not cover damage to the product caused by abuse or improper use. The following are consumables and are not covered under the warranty: the filter, filter housings, and the cuvette. With the exception of the photodiode battery replacement, contact Vernier Technical Support for all repairs and service. Do not attempt to open the case of the device. Do not attempt to change or repair the lamp; doing so will create an unsafe operating condition and will void the product warranty.



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