

QAM-I-104

Operation and Calibration of the Hach Portable Spectrophotometer

Revision 11

Approval:



Laboratory Manager

2-14-24

Date



Concurrence

02-14-2024

Date

Effective date: 2-27-24

Renewal date: _____ Initials: _____

Texas Institute for Applied Environmental Research

Operation and Calibration of the Hach Portable Spectrophotometer

1. Applicability and Purpose

This procedure applies to the operation and calibration of the Hach DR/2800™ spectrophotometer. This procedure is performed prior to the analysis of COD in accordance with SOP-C-102, "Determination of Chemical Oxygen Demand", orthophosphate by SOP-C-106, "Determination of Orthophosphate as Phosphorus" or other approved procedure when using this instrument. The purpose of this procedure is to establish a method for calibrating the DR 3900 or equivalent. The operation of the DR 3900 allows for the determination of other analytes when calibrated to the correct wavelength in accordance with specific SOPs. This instrument is also a backup and supplement for QAM-I-103, "Operation and Calibration of the UV-Vis Spectrophotometer".

2. Definitions

- i. Hach Company- PO Box 608, Loveland, CO 80539-0608, Technical Assistance telephone number 1-800-227-4224.
- ii. Standard QA/QC definitions are found in QAM-Q-101, "Laboratory Quality Control".

3. Equipment, Reagents, and Standards

- i. Equipment
 - a. Hach DR 3900 Spectrophotometer or equivalent
 - b. 25 mL cuvette or other sample cell
 - c. Soft cloth, Kimwipes™, or equivalent.
- ii. Reagents and Standards used in SOP-C-106, C-102 or appropriate method.

4. Procedure

- i. Operation and Calibration
 - a. Turn on the Spectrophotometer by pressing the power button.
 - b. Each time the instrument is powered up, a series of self checks will begin.
 - c. The Main Menu is displayed when diagnostics are completed.
 - d. Select the desired function from the Main Menu. "Single Wavelength" is the most common function used.
 - e. Press on the wavelength in the blue bar at the top of the screen to change the wavelength.

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- f. Press "Options" to change settings.
- g. Allow a warm-up period of at least 15 minutes.
- h. Open the lid and remove the cuvette adapter cover, if present.
- i. Fill the cuvette with reacted blank, standard or sample in the order set for reading by the analytical method.
- j. Remove any spots or smudges from the cuvette with the soft cloth or Kimwipe™.
- k. Place the cuvette containing the liquid to be read into the holding slot of the adapter.
- l. Press the "Zero" key to blank the instrument.
- m. Press the "Read" key to read the absorbance.
- n. Continue with each progressively more concentrated standard and record absorbances for them. Ensure that the cuvette is turned the same way for each sample or standard, and that it is clean of droplets or smudges.
- o. Prepare a graph and curve formula of the initial calibration blank and subsequent standards.
- p. Obtain readings of QC standards and reacted sample and enter the absorbances into the curve formula to obtain concentrations.
- q. To power off the instrument press and hold the power button for approximately 5 seconds.
- r. Wipe down with moist cloth or paper towel to remove residues.

5. Quality and Control Safety Aspects

- i. All aspects of this procedure comply with QAM-Q-101, and QAM-S-101, "Laboratory Safety".
- ii. Safety
 - a. The specific method being used may require use of hazardous substances. Waste is handled in accordance with QAM-W-101, "Disposal of Laboratory Waste". COD vials contain mercury.
 - b. Gloves, impact resistant safety glasses, and a lab coat are worn as needed during phases of this procedure.
- iii. Quality Control
 - a. The precision and accuracy of the sample measurements are dependent upon a good baseline. To ensure accurate measurements of the analyte, all QC standards and samples being analyzed are treated exactly as the blank and calibration standards during all phases of this procedure.

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- b. The reaction vial/cuvette is visually inspected to ensure there are no smudges or obstructions on the glass which may alter the cell pathlength.
- c. All data that do not meet quality requirements are handled in accordance with QAM-Q-105, "Corrective Actions."
- d. All data are recorded in personal logbooks or E-logs in accordance with QAM-A-102, "Document and Data Control".
- e. All instrument maintenance is documented in accordance with QAM-Q-103, "Equipment Maintenance".
- f. If used as a back-up to the UV-vis in normal operation, standard DOP is required for any method and calibration curve performed.

6. References

- i. DR 3900 Basic User Manual, Hach Company, Catalog # DOC022.97.90324, 09/2020, Edition 10.
- ii. DR/2000 Spectrophotometer Handbook and Procedures Manual, Method 8000, Hach Company, Catalog #44879-00, 1991.
- iii. Methods for Chemical Analysis of Water and Wastes, U. S. Environmental Protection Agency, (1983), Cincinnati, OH, Method 410.4.
- iv. The National Environmental Laboratory Accreditation Conference Institute (TNI) standard, 2016.

7. Attachments

None