

QAM-I-104

**Operation and Calibration of the  
Hach Portable Spectrophotometer**

Revision 10

Approval:

  
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Laboratory Manager

2-19-20  
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Date

  
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Concurrence

2/18/20  
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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/2800™ or equivalent. The operation of the DR/2800™ 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/2000™ Spectrophotometer or equivalent
  - b. 25 mL cuvette
  - 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 Hach DR/2800™ Spectrophotometer by pressing the button on the back of the instrument.
  - b. Allow a warm-up period of at least 15 minutes.
  - c. Using the touch screen, select the "Single Wavelength" mode.
  - d. To set the wavelength select "Options," then "λ." Input the desired wavelength and press "OK."
  - e. Open the lid and remove the cuvette adapter cover, if present.

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- f. Fill the cuvette with reacted blank, standard or sample in the order set for reading by the analytical method.
- g. Remove any spots or smudges from the cuvette with the soft cloth or Kimwipe™.
- h. Place the cuvette containing the liquid to be read into the holding slot of the adapter.
- i. Press the "Zero" key if the liquid is the initial calibration blank, otherwise wait until the reading stabilizes and record the absorbance.
- j. 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.
- k. Prepare a graph and curve formula of the initial calibration blank and subsequent standards.
- l. Obtain readings of QC standards and reacted sample and enter the absorbances into the curve formula to obtain concentrations.
- m. Turn off instrument and 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.
  - 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.

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- 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/2800™ User Manual, Hach Company, Catalog # DOC022.53.00720, November 2009, Edition 3.
- 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 (NELAP) standard, 2016.

#### 7. Attachments

None