

SOP-C-121


Determination of Residual Chlorine

Revision 9

Approval:


Laboratory Manager

3-19-20
Date


Concurrence

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Date

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Jpn

Texas Institute for Applied Environmental Research

4-12-23 to 3-27-23

3-19-24

JMH
Jpn

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- i. **Identification of the method**
 - a. Standard Methods SM 4500-Cl G. Modification accepted: mercuric chloride is not used as a mold inhibitor for DPD indicator due to toxicity. Calibration is not performed.
- ii. **Applicable matrix or matrices**
 - a. Water
- iii. **Limits of detection and quantitation**
 - a. Detectable or nondetectable only down to about 0.2 mg/L.
- iv. **Scope and application, including parameters to be analyzed**
 - a. The method is applicable to natural and treated waters and is only a screening tool for presence/absence of total chlorine by visual color detection.
 - b. This procedure should be used in conjunction with other procedures that require total residual chlorine screening.
 - c. *This method is not TNI accredited for data reporting.*
- v. **Summary of the method**
 - a. The presence of residual chlorine using N, N-Diethyl-p-Phenylenediamine (DPD) colorimetric spectrophotometry.
- vi. **Definitions**
 - a. Total residual chlorine: combined forms of chlorine including organically bound, free available and ammonia bound chlorine (forming chloramines).
 - b. Hach: Hach Corporation, Loveland, Colorado.
- vii. **Interferences**
 - a. Color, turbidity, oxidized manganese and iron, very high organic matter concentration
- viii. **Safety**
 - a. All aspects of this procedure comply with QAM-S-101, "Laboratory Safety".
 - b. DPD oxalate and other chemicals are toxic. Handle with gloves and avoid inhalation or ingestion.
 - c. Read the MSDS prior to handling any chemical.

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ix. Equipment and supplies

- a. 25 mL glass container, Hach cuvette, flask or equivalent, nonvolumetric

x. Reagents and standards

- a. Commercially available mixed N, N-Diethyl-p-phenylenediamine (DPD), such as Hach DPD pillows.
- b. No standards are used in this screening procedure.

xi. Sample collection, preservation, shipment and storage

- a. Holding Time: immediate, or noted otherwise. Analysis is best done in the field when used for actual quantitation.
- b. Refrigerate sample at >0 to $\leq 6^{\circ}$ C if not analyzed immediately

xii. Quality control

- a. All aspects of this procedure comply with QAM-Q-101, "Laboratory Quality Control", though no actual quality control applies to this SOP.

xiii. Calibration and standardization

- a. none

xiv. Procedure

- a. Holding time is not applicable to this procedure. Analysis should be performed immediately upon sampling or as soon as possible. Ideally, chlorine should be measured in the field within 15 minutes of sample collection. Light and exposure to air reduce chlorine levels rapidly.
- b. Sample color and turbidity interferences should be compensated with an unreacted sample aliquot, if necessary.
- c. The simple presence/absence test of chlorine (ex. in SOP-C-101 for BOD) may be determined by a color change to pink when adding one DPD reagent pillow to a 10 or 25mL (depending on type of DPD) container of sample and mixing.
- d. Pink after 2 minutes indicates chlorine presence.

xv. Data analysis and calculations;

- a. none

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xvi. Method performance

- a. Method performance: refer to QAM-Q-101, "Laboratory Quality Control"

xvii. Pollution prevention

- a. Pollution prevention: refer to QAM-W-101, "Disposal of Laboratory Waste".

xviii. Data assessment and acceptance criteria for quality control measures

- a. Data assessment and acceptance: refer to QAM-Q-101, "Laboratory Quality Control"

xix. Corrective actions for out-of-control data

- a. Corrective action: refer to QAM-Q-105, "Corrective Actions"

xx. Contingencies for handling out-of-control or unacceptable data

- a. refer to QAM-Q-101, "Laboratory Quality Control" and QAM-Q-105, "Corrective Actions"

xxi. Waste management

- a. Waste management: refer to QAM-W-101, "Disposal of Laboratory Waste"
- b. No toxic waste is generated by this SOP.

xxii. References

- a. Standard Methods for the Examination of Water and Wastewater, latest online edition (2017), ed. by Arnold E. Greenburg, et al., APHA, AWWA, Washington, D.C., Method 4500-Cl G.
- b. The National Environmental Laboratory Accreditation Conference Institute (TNI) standard, 2016.

xxiii. Any tables, diagrams, flowcharts and validation data

None