



Laboratory Resources and Solutions, Inc.

A Full Service Analytical Laboratory Provider

P.O. Box 1260
205 6th Avenue
Ashville, AL 35953

pH – Field Analysis Standard Operating Procedure (SOP)

Revision History

This page documents the revisions over time to the SOP. The most recent iteration should be listed in the first row, with consecutive versions following. Signatures may be required for revised documents.

[illegible]

2. Table of Contents

1. Title Page
2. Table of Contents
3. Procedures
 - a. Scope and Applicability
 - b. Summary of Method
 - c. Definitions
 - d. Health & Safety Warning
 - e. Cautions
 - f. Interferences
 - g. Personnel Qualifications / Responsibilities
 - h. Equipment and Supplies
 - i. Step by Step Procedure for Calibration and Analysis
 - j. Data and Records Management
4. Quality Control and Quality Assurance
5. Reference Section

*Attachment- PT Evaluation Report

3. Procedures

a. Scope and Applicability

This SOP will outline procedures to conduct field analysis for pH as related to the analysis of wastewater and stormwater samples.

Individual Reference Methods	
pH	SM 4500 H ⁺ B – 2000

Individual scopes & applications	
pH	This method is used to measure the intensity of the acidic or basic nature of an aqueous solution and is expressed as pH or hydrogen ion activity. pH is one of the most common tests in environmental conditions and can frequently affect other parameters.

b. Summary of Method

Individual Method Summaries	
pH	A sample is collected and the pH is measured by inserting the calibrated pH and temperature probe into the sample and recording the reading.

c. Definitions

1. MB – Method Blank – A sample that is intended to contain none of the analytes of interest and which is subjected to the usual analytical or measurement process to establish a zero baseline or background value.
2. CV – Calibration Verification – A standard containing the target analytes that is prepared from a separate standard than that which was used to calibrate the instrument. This standard (buffers) is used to verify the calibration curve.
3. DI water – Deionized water – Water that has been through a deionization process and meets ASTM standard for Type I or II water. May substitute distilled water as long as it meets ASTM standard for Type I or II water.
4. COC – Chain of Custody – An unbroken trail of accountability that ensures the physical security of samples, data, and records.

d. Health & Safety Warning

Analyst should always utilize all appropriate personal protective equipment during analysis. All chemicals should be handled and stored in accordance with their Material Safety Data Sheet (MSDS).

e. Cautions

Instruments and reagent/standards should be stored inside in a dry room that is at a constant temperature. Storing instruments outside in a vehicle could cause damage to the meter and degrade reagents/standards.

pH Buffers: Record lot numbers and expiration dates for the buffers (4,7,10).

**** DO NOT CALIBRATE pH METER WITH EXPIRED BUFFERS-** this will void calibration and any field measurements.

f. Interferences

Individual Method Interferences	
pH	pH measurements are affected by temperature and organic material within the sample. Eliminate their interferences by frequently cleaning probe and report the temperature at which the pH was measured.

g. Personnel Qualifications / Responsibilities

Analyst should be familiar with the requirements established within this SOP and display proficiency with the techniques contained herein.

*See attached PT (Proficiency Testing) Evaluation Report.

h. Equipment and Supplies

Equipment Needed	
pH	pH meter, pH probe, temperature probe

Reagents Needed	
pH	DI Water

Standards Needed	
pH	4 buffer, 7 buffer, 10 buffer

i. Step by Step Procedure

➤ **Instrument or Method Calibration:**

Calibrate all meters daily or with each use following the manufacturer's instructions.

➤ **Collection and Preservation**

pH can be collected in glass or plastic and should be analyzed ASAP (within 15 minutes)

Calibration:

1. Work in a well-lighted **CLEAN** area for best results. Let all buffers come to room temperature (20-25 degrees Celsius) prior to testing.
2. Open the pH meter kit (black case) and take pH meter out of its clear plastic holder.
3. Pull the protective bottom sleeve off of the pH meter and squirt a little water into it, rinse the glass electrode on pH meter with DI water and blot excess water off. Replace the protective sleeve (with water in the sleeve) for at least 5 minutes but **DO NOT STORE GLASS ELECTRODE IN WATER FOR EXTENDED AMOUNTS OF TIME (< 1HR).**
** Also, be sure not to touch the glass electrode with your fingers.*
4. There are 3 colored (Red-4, Yellow-7, Blue-10) pH buffers included in the kit. Invert each buffer 3 times or shake well to be sure buffer is mixed prior to use.
5. Press and release the on/off button on the pH meter to turn the pH meter on. Remove the protective bottom sleeve from the pH meter and rinse with DI water and blot excess water off gently. Open the Yellow-7 buffer and place the rinsed pH electrode (without the protective bottom sleeve) into the yellow-7 buffer, being sure that the glass electrode on the pH meter is completely submerged into the buffer. Press and release the "CAL" button on the pH meter. The display will indicate that you are in the calibration mode. Keep the glass electrode submerged for a minimum of 2 minutes or until the display (7.01) is stable for 30 full seconds. Once the display is stable for 30 seconds and while keeping the electrode submerged in the buffer solution, press and release "HOLD/ENT" button on the pH meter. The meter will calibrate to the particular buffer being used.
6. Remove the pH meter from the buffer and rinse the electrode with DI water, blot the excess water off gently. Repeat this step with the two remaining buffers being sure to rinse the pH electrode between each buffer and blot the excess water off of the glass electrode.
7. When finished calibrating with the 3 buffers, rinse glass electrode and replace the protective bottom sleeve (with water in sleeve). To be sure that pH meter is calibrated correctly read the pH on the Yellow-7 buffer - simply place the rinsed glass electrode into the Yellow-7 buffer and the meter will read the pH directly along with the temperature of the buffer. Remember to let the reading stabilize for 30 seconds. Record all readings for future reference.

Analysis:

1. Perform pH meter calibration as described in “Calibration” procedure above.
2. Turn pH meter on if meter has been turned off. When meter is first turned on it will be in the “read mode”.
3. Pull off the protective bottom sleeve and rinse glass electrode with DI water and blot excess water off gently.
4. Place the pH meter into the field sample at point of sample discharge, being sure that the glass electrode on the pH meter is completely submerged into the sample flow.
5. Let reading stabilize for a minimum of 30 seconds.
6. Record pH and temperature readings. Be sure to record the date, time and field personnel initials along with filed readings. All data must be retained for 5 years.
7. After taking the pH meter out of the sample flow, rinse the pH meter with DI water, being sure to rinse the glass electrode completely.
8. Turn pH meter off by pressing the “ON/OFF” button- display will go blank.
9. Leave the protective bottom sleeve off and let the pH meter air dry for 24 HRS. Once dry, replace the dry protective sleeve and place pH meter back into its clear case. Store the pH meter and pH buffers in a dry area away from moisture.

j. Data and Records Management

All data must be retained for five (5) years or until the laboratory’s next audit, whichever is longer.

4. Quality Control and Quality Assurance Section

QC								
	MB		CV		QCS		DUP	
	Frequency	Acceptance Criteria *	Frequency	Acceptance Criteria *	Frequency	Acceptance Criteria *	Frequency	Acceptance Criteria
pH	N/A	N/A	Daily	0.1 SU	Qtrly	5%	1/20	20% RPD

* May utilize acceptance criteria off of the manufacture’s certificate of analysis.

- If the results are outside of the established acceptance range repeat once, if outside the acceptance range the second analysis do not use the meter and investigate the cause of the problem (i.e. user error, bad standards, etc).

5. Reference Section

- 40 CFR 136, Code of Federal Regulations, “Guidelines Establishing Test Procedures for the Analysis of Pollutants”
- Standard Methods for the Examination of Water and Wastewater, 22nd Edition