

Standard Operating Procedures for pH measurement

Acid Deposition and Oxidant
Research Center
(ADORC)

Introduction

- What is SOPs ?
- Objectives of SOPs
- Major Items to be included in the SOPs in wet deposition monitoring
- Model SOPs in ADORC

What is SOPs ?

The step-by-step procedures used in all the processes of the monitoring system, I.e. in the field, laboratory, and data management areas.

Objectives of SOPs

To provide a method to ensure

- that all personnel perform the same procedure to avoid the variance of data quality between personnel in charge
- that they conduct their works with good understanding of QA/QC.

Major Items to be included in SOPs in wet deposition monitoring

(see Appendix 2 in QA/QC program for wet deposition monitoring)

- Sampling
- Sample transportation and storage
- Measurement and chemical analysis
- Quality assurance and quality control
- Management of sampling instruments, laboratory, measurement/ analysis instruments and reagent/glassware
- External audit

SOPs in ADORC for measuring precipitation samples

- Reception and Storage of precipitation samples
- Measurement and chemical analysis
 - **Measurement of pH**
 - Measurement of EC
 - Analysis of anions
 - Analysis of cations
- Data reporting

Model SOPs: Measurement of pH

- (1) Applicable samples
- (2) Principles and summary of the measurement method
- (3) References
- (4) Measurement method
 - 1) Instruments and apparatus
 - 2) Reagents
 - 3) Preparation of working reference solutions
 - 4) Operation procedures
 - i) Set up of pH meter
 - ii) Calibration of pH meter
 - iii) Measurement of sample

Operation procedure

i) Set up of pH meter

Set up the pH meter as follows according to the **Manual** (F-series, basic operation) (1993, Horiba Co. Ltd.)

☐ cancel the auto hold function

☐ fix the temperature at **25** by manual

☐ temperature compensation function: off

☐ temperature conversion function: off



ii) Calibration of pH meter

1. Power on the water bath. Set the temperature at 25 ± 0.5 .
2. Open the stop rubber of the inlet for adding inner solution of pH electrode (saturated KCl solution).
3. Add the inner solution, rinse the detection parts of pH electrode and the thermometer by deionized water carefully.
4. The stop rubber should be opened during pH measurement
5. Power on pH meter and push F1 button to display the pH calibration screen.

6. Take about 70 ml of the three kinds of pH standard solution to each beaker and soak into water bath for retaining the temp. at 25 .
7. ~~At first, take about 20 ml of the buffer solution~~ (pH 6.86) in a beaker, and immerse the pH electrode, then stir gently for a few seconds.
8. Take another about 20 ml of pH 6.86 solution in to same beaker.
9. After immerse the pH electrode, push MEAS key.
10. After confirming that the temperature of the standard solution is 25 ± 0.5 and the indication value of pH meter is stable within $\pm 0.00X$, push the MEAS key once again. Indication value will be automatically 6.865.
11. Rinse the electrode (detection part) with deionized water.
12. Repeat 6-11 using buffer solution (pH 4.01). The indication value will be automatically indicate 4.007.

13. Take about 20 ml of buffer solution of pH 6.86 in a beaker, and immerse, then stir gently, push MEAS key.

14. Confirming the temperature of the standard solution is 25 ± 0.5 and the indication value of pH meter is stable within $\pm 0.00X$, push the MEAS key once again. Indication value will be automatically 6.865.

15. Confirm the indication value of pH agree with that of pH standard solution within ± 0.02 . When it does not agree, repeat the operation after 7.

16. Rinse the electrode.

17. Repeat the same operation using buffer solution of 4.01. Confirm the indication value agree with that of standard solution (4.01) within ± 0.02 . When it does not agree, repeat the operation after 7.

18. Rinse the electrode with deionized water.

19. Repeat the calibration operation using borate standard solution and confirm the indication value agree with that of standard solution (9.18) within ± 0.03 .

20. Rinse the electrode.

21. Measure the working reference solution and confirm the indication value agree with that of theoretical values within 0.05.

Analysis of samples (pH measurement)

a) The sample volume for pH measurement is more than 60 ml

Rinse the electrode (detection part) with deionized water.

Take about 20 ml of sample in a beaker, and immerse the pH electrode, then stir gently for a few seconds. Repeat this operation. Then, take another about 20 ml of sample solution in the same beaker which soaked in water bath. After immerse the pH electrode, push MEAS key. After confirming that the temperature of the sample solution is 25 ± 0.5 and the indication value of pH meter is stable, read the indication value and record it in a notebook with water temperature.

b) The sample volume for pH measurement is less than 60 ml

Rinse the electrode (detection part) with deionized water. Wipe drops off the electrode with Kim wipe.

Immerse the pH electrode in the sample solution and swirl the sample gently for a few seconds in the water bath regulated at 25 ± 0.5 . Push MEAS key.

After confirming that the temperature of the sample solution is 25 ± 0.5 and the indication value of pH meter is stable, read the indication value and record it in a notebook with water temperature.

Abandon the sample in the beaker used for pH measurement. This sample should not be used for the measurements of other parameters.