QAM-I-105

Operation and Calibration of the pH Meter

Revision 12

Approval:

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Laboratory Manager Date 3-12-24

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1. **Applicability and Purpose**

This procedure applies to the operation and calibration of the accumet® AB150 pH meter or equivalent. This procedure is performed prior to any analysis using this meter. By performing the calibration procedure, the technician reduces anomalies due to instrument sensitivity fluctuations. The operation of this instrument allows the analyst to determine the pH of water samples or aqueous solutions and suspensions of solids that are received or prepared by the TIAER chemistry laboratory.

2. **Definitions**

i. pH- A measure of acidity and alkalinity of a solution that is a number on a scale on which a value of 7 represents neutrality and lower numbers indicate increasing acidity and higher numbers increasing alkalinity. Each unit of change represents a tenfold change in acidity or alkalinity. pH is the negative logarithm of the effective hydrogen-ion concentration or hydrogen-ion activity in gram equivalents per liter of the solution.

ii. Automatic temperature compensation- internal temperature sensors in the conductivity cell are read by the meter and the analysis reading is adjusted for any difference between the sample temperature and standard operating conditions.

iii. pH electrode- probe attached to pH meter containing a glass pH indicating electrode coaxially joined to a silver/silver chloride reference electrode used by the instrument to measure the pH of a sample.

iv. Refer to QAM-Q-101, “Laboratory Quality Control” for standard QA/QC definitions.

3. **Equipment and Reagents**

i. Equipment
   a. accumet® AB150 pH meter
   b. accumet® AccuTupH probe or equivalent
   c. Temperature probe
   d. stir plate
   e. various beakers

ii. Reagents
   a. Deionized water (DI)- water that has passed through ion exchange resin and meets Type II criteria (specific conductance < 1.0 µS/cm).

iii. Standards
   a. pH buffers- these are normally purchased pre-made.

5. Procedure

i. Instrument Set Up
   a. If meter is off or in standby mode, press the “Power” key and release.
   b. Press and release the “mode” key until the digital display indicates pH mode.

ii. Standardization
   a. Immerse the DI-rinsed electrodes into a buffer from the selected group. Stir, moderately. Be sure that the fill hole, if present, is in the open position.
   b. Press “std” to access the Standardization mode. The selected buffer group is displayed briefly.
   c. Wait for reading to stabilize. The meter will assist you with this by displaying the word “Stable” when the reading is stabilized.
   d. Press “std” again to initiate standardization. The meter will automatically recognize the buffer. The meter then returns to the Measure screen. If the buffer is not recognized, consult the instrument manual for maintenance steps.
   e. Record the temperature and corrected temperature of the buffer. Record the slope between points.
   f. Repeat steps for all buffers. A standardization of at least 2 points is performed near the anticipated pH of the samples. A third point may be measured as an ICV/LCS. At least one other second source buffer is measured to establish linearity of the probe readings.

iii. Sample Measurement
   a. Make sure the meter is in measure mode.
   b. Immerse the electrode along with temperature probe into the sample solution. Stir moderately. Be sure that the fill hole, if present, is in the open position.
   c. When the meter senses that the reading has stabilized, the stable icon will appear under the reading. The pH and temperature readings may be recorded at this time.
   d. Close out the batch readings of any samples by rechecking calibration verification of a buffer standard at pH 7. Acceptance limits of the standard are ± 0.1 from actual pH of the standard.

6. **Quality Control and Safety Aspects**
   i. All aspects of this procedure comply with QAM-Q-101, "Laboratory Quality Control", and QAM-S-101, "Laboratory Safety".
   ii. The electrode is rinsed thoroughly with DI water prior to use.
   iii. The accuracy and precision of sample measurements are dependent upon a stable reading. Be sure the reading is stable before recording values.
   iv. Visually inspect electrode to ensure there is liquid inside. The fill hole, if present, is closed and the electrode immersed in pH 4 buffer when not in use.
   v. The analyst consults the MSDS files if he/she has any question as to the safe handling of any reagent required by this procedure for analysis.

7. **References**
   i. Fisher Scientific Accumet® Basic (AB) Benchtop Meters, 68X613601, Revision 0. Fisher Scientific, July 2012.
   ii. Combination pH Electrodes with Silver/Silver Chloride References, Accumet, 257151-001 Rev. B, 12/10.
   iii. Standard Methods for the Examination of Water and Wastewater, latest online edition, Washington D.C., Method 4500-H^+ A&B (approved 2018).
   iv. The National Environmental Laboratory Accreditation Conference Institute (TNI) standard, 2016.

8.0 Attachments

None