pH Measurement SOP

HANNA® instruments

1.0 Purpose

Accurate pH determinations require several important maintenance, calibration, and measurement processes. Improper calibration, storage, or cleaning of the pH electrode can cause inaccurate readings, which can impact quality and safety.

The purpose of this standard operating procedure (SOP) is to establish all the necessary steps to use, store, and care for a pH electrode. Specific attention is given to address the differences in measuring solid and liquid samples.

2.0 Materials

- pH meter with electrode
- Pure water (e.g. deionized (DI), reverse osmosis (RO), distilled)
- pH calibration buffers (e.g. pH 4.01, 7.01, 10.01)
- pH electrode cleaning solution
- pH electrode storage solution
- Beakers
- Magnetic stir plate and stir bars (optional)

3.0 Setup (Before You Measure)

3.1 Electrode Preparation

- Remove protective cap from the electrode.
- Inspect the electrode for any scratches or cracks. If present, replace the electrode.
- Shake the electrode down to remove any air bubbles inside the glass bulb.
- Ensure that the electrode was cleaned and stored properly (see 5.0 Maintenance).
- Rinse electrode with pure water to remove any salt deposits.

3.2 Calibration

- Fill a beaker with enough pH calibration buffer to cover the electrode junction (about 75 mL in a 100 mL beaker).
- Place the electrode in the beaker containing pH calibration buffer and gently stir.
- Confirm the calibration point when the reading is stable, or when the digits do not change for at least 5 seconds.
- Repeat for additional calibration points. Be sure to rinse with pure water between calibration points. At least two calibration points are recommended.

NOTE: In general, pH 4 and 7 buffers can last 4-8 weeks after opening, and an alkaline pH buffer (i.e. pH 10) will last 1-2 weeks after opening.

4.0 Measurement

4.1 Liquid Samples

- Rinse the electrode with pure water.
- Immerse the tip in the sample and stir gently, or use a magnetic stirrer.
- Wait until the reading is stable, or when the digits do not change for at least 5 seconds before recording the measurement.
- Rinse the electrode with pure water until all residues are removed.
- Repeat this procedure for additional samples.

NOTE: For solid or semi-solid samples, it is possible to create a slurry of deionized water and solid sample and perform measurements as above. Follow approved methods.

4.2 Solid Samples

- Rinse the electrode with pure water.
- Use a knife or auger to make a hole for the pH electrode. Some pH electrodes have an integrated blade. In these cases, simply insert the probe into the sample.
- Insert the tip of the probe into the hole. Ensure electrode junction coverage by placing the electrode at least 2 cm (0.75") into the sample.

5.0 Maintenance (After You Measure)

5.1 Electrode Cleaning

- Fill a 100 mL beaker with approximately 75 mL cleaning solution.
- Place the pH electrode into the cleaning solution for at least 15 minutes, making sure the junction is covered.
- If a refillable electrode is visibly contaminated, drain the reference electrolyte chamber with a syringe or capillary pipette and refill with fresh electrolyte. Allow the electrode to stand upright for one hour.
- Place in storage solution for at least 1 hour and re-calibrate before next use.

5.2 Electrode Storage

- Replace the storage solution in the protective cap or beaker.
- Submerge the glass bulb and junction in protective cap or beaker with solution.
- A dry electrode should soak in storage solution for at least one hour prior to use and should be re-calibrated. However, overnight is optimal.

Clean Regularly | **Calibrate** Often | **Condition** Always