

**STANDARD OPERATING PROCEDURE
STAN MAYFIELD BIOREFINERY PILOT PLANT**TITLE: pH Measurement

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A. Scope

This procedure describes how to calibrate a pH probe and take a measurement.

B. Safety and Training Requirements

Refer to UF lab safety policies and review the Material Safety Data Sheets (MSDS) for each material listed in section D below before starting any process work.

Review the location of fire extinguishers, fire blankets, safety showers, spill cleanup equipment and protective gear before beginning any process work.

During operations in the laboratory, the following safety gear will be utilized at all times:

- Lab Coat
- Safety Goggles or Face Shield
- Protective Gloves (nitrile, neoprene)

Avoid inhalation of vapors and wear nitrile or neoprene rubber gloves. Contain spills by using chemical spill kits.

C. Related Documents and SOPs

1. Sampling SOP-0511
2. Denver Instrument 200 Series Meters Operating Manual (200 Series Meters)

D. Preparation/Materials/Equipment

1. Denver Instrument Model 220 pH/conductivity meter and probe.
2. Squirt bottle filled with deionized water.
3. Liquid waste container (beaker)

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4. pH 7.0 buffer solution (Fisher Scientific, SB 108-20, 20 L)
 5. pH 4.0 buffer solution (Fisher Scientific, SB 98-20, 20 L)
 6. Stir bar
 7. Stir plate
 8. 2 M KCl solution
 9. 30% formaldehyde solution
 10. 100 mL calibrated cylinder
 11. 100 mL plastic beaker

E. Detailed Procedure

1. Make sure the probe is submerged in a 2 M KCl-formaldehyde solution whenever the probe is not in use. To prepare the solution;
 - a. Pour 70 mL of 2 M KCl in a 100 mL calibrated cylinder.
 - b. Add 3 mL of 30% formaldehyde to the 2 M KCl solution.
 - c. Replace the solution weekly or as needed.
2. Calibrate the pH probe.
 - a. Immerse the electrode in a buffer and stir moderately. Allow the electrode sufficient time to reach equilibrium.
 - b. Press "Standardize".
 - c. Press "1) Auto-enter a buffer".
 - d. Follow the prompts on the display.
 - e. Repeat steps E.2.a, E.2.b, E.2.c, and E.2.d to enter each buffer (usually pH 4.0 and pH 7.0).
 - i. With more than one buffer the meter performs a diagnostic check on the electrode.
 - ii. The electrode is considered good if the slope is between 90 to 105%.
3. Place at least 30 mL of the sample in a 100 mL plastic beaker.
4. Take pH probe out of 2 M KCl-formaldehyde solution and rinse with deionized water using a squirt bottle into waste container
5. Submerge the pH probe in the sample while stirring the sample using a stir bar and stir plate. Be careful not to hit the electrode with the stir bar.
6. Press the "Measurement" key to return to the measurement screen.
7. Record the pH after it has equilibrated.
8. Rinse the pH probe using DI water.
9. Place the pH probe back into the 2 M KCl-formaldehyde solution.

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F. Data Archival and Analysis

Record all measurements in the laboratory notebook including the date, time, vessel, and batch number of the sample.