



COMBINATION pH ELECTRODE

CODE 1904

OPERATING TECHNIQUES

1. The electrode is shipped in a plastic bottle containing a solution of potassium chloride in buffer. The electrode should remain in the bottle until it is used. The bottle and the solution should be saved for storing the electrode (see Electrode Storage).
2. During shipment the air bubble in the electrode's stem may move into the bulb area. If bubbles are seen in the bulb area, hold the electrode by its top cap and shake downwards.
3. Vigorously stir the electrode in the sample, buffer or rinse solution to bring solution to the electrode's surface quickly and improve speed of response.
4. Use a part of the next sample or buffer which is to be measured in the rinse solution to minimize contamination from carryover.
5. When calibrating, use a buffer close in value to that expected from the sample to minimize span errors.
6. Keep buffers and samples at the same temperature to eliminate the need to correct values for temperature effects.
7. pH readings stabilize faster in some solutions than others; allow time for the reading to stabilize. In general, buffers provide stable readings in several seconds (tris buffers take somewhat longer) while samples usually take longer.
8. Keep in mind that all pH electrodes age with time. Aging is characterized by shortened span and slower speed of response. If the meter has a manual or microprocessor slope (span) control, the control can be adjusted to compensate for electrode span errors (but will not affect the speed of the response). Aging is best detected by calibrating the electrode in, for example, a 7 buffer, then rinsing and placing the electrode in a 4 buffer. As a rule, if the span is 10% or more in error (a reading of 4.3 or higher for this example) the electrode should be cleaned and retested (see Electrode Cleaning). If performance is not restored, the electrode should be replaced.

CALIBRATION & MEASUREMENT

Follow the procedure recommended by the pH Meter manufacturer keeping in mind the Operating Techniques outlined in the previous section. Frequency of calibration is a function of the electrode, the pH meter and the solutions the electrode is exposed to. The electrode and meter should always be calibrated together with the calibration frequency determined by experience. Use two buffers, for example 7 and 4, or 7 and 10. Use the following procedure for both calibration in buffers and for sample measurements:

1. Remove the electrode from the soaker bottle. Save the soaker bottle to store the electrode in after use (see Electrode Storage).
2. Vigorously stir the electrode in a rinse solution. Shake off excess solution.
3. Vigorously stir the electrode in the buffer or sample, and then allow the electrode to rest in the container.
4. Wait for the reading to stabilize. Record result.
5. Repeat these steps for each sample or buffer determination.
6. Between readings place the electrode in a beaker containing about 2 cm (1 inch) of pH 4 buffer or distilled water.

ELECTRODE STORAGE

When pH readings are made several days or weeks apart, the electrode should be stored by replacing it in the soaker bottle, filled with buffer solution.

ELECTRODE CLEANING

Coating of the pH bulb can lead to erroneous readings including shortened span. The type of coating will determine the cleaning technique. Soft coatings can be removed by vigorous stirring or by use of a squirt bottle. Organic chemical or hard coatings should be chemically removed. Only in extreme cases should the bulb be mechanically cleaned as abrasion can lead to permanent damage.

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PO Box 329 • Chestertown • Maryland • 21620 • USA
800-344-3100 • 410-778-3100 (Outside U.S.A.) • Fax 410-778-6394
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