

Instruction Sheet

The Orion KNIpHE[®] Electrode

Measuring the pH of Meat

The measurement of pH of freshly slaughtered meat is extremely important to ascertain meat qualities such as texture, grade and flavor. Existing types of pH electrodes are unsuitable for this application because their construction, usually unprotected glass, are extremely vulnerable to breakage, thereby causing contamination of the meat either from the glass, the internal electrolyte, or both. To alleviate this problem, we have developed the KNIpHE.

The KNIpHE consists of a stainless steel blade and holder into which a special Orion spear electrode is inserted. The blade, which protects the electrode, opens the meat allowing the pH bulb to come into contact with the sample for the pH measurement. This method enables quality of meat to be accurately measured.

Background

The pH level of animal flesh is very critical at the time of slaughter and is normally pH 7.0/7.1 (almost neutral). After slaughter, a rapid acceleration of enzyme activity converts glycogen into lactic acid, thereby lowering the pH level in the meat. This change to acid conditions occurs over a period of 18 to 24 hours for beef and stabilizes between pH 5.4 and pH 5.7. At this level, the texture and color of the meat is perfect. Should the pH fail to drop below 6, then the meat will be classified as dark cutting meat, which creates many problems for the producers.

The change to acid conditions is dependent upon several factors such as breed, rearing characteristics, the treatment and conditions of the animal just prior to slaughter.

The conditions in pork flesh are different. The changes from neutral to pH 5.5 occurring between 6 to 10 hours after slaughter. Carcass lamb behaves in a similar fashion to pork but at a slower rate, typically 12 to 15 hours after slaughter.

pH Determination Meats and Other Semi-Solids

It has long been established that the pH value of meat is a crucial parameter in determining tenderness, flavor, storage, and in the case of meat processing and canning, the technical requirement for such processing.

Orion has now developed a complete pH electrode for the determination of the pH value of meat, Orion 7120. The protective stainless steel pH KNIpHE contains an accurate Orion combination electrode specifically designed for this application. The low sodium-error spear-shaped pH glass is coated with a protein retarding surface. The reference cell contains a Ag/AgCl system for fast temperature response and a highly porous junction to allow free flow and prevent junction blockage. Replacement electrodes may be ordered as Orion 7121.

Required Equipment

Meter - A pH/mV meter with resolution of 0.1 mV is recommended.

- Solutions** – 1. One or two buffer solutions at known pH value to calibrate the pH/mV meter. The two pH buffer solutions should bracket the expected pH range of the samples being measured.
2. Deionized water for rinsing electrode.

Electrode Preparation

1. Remove the storage cap from the pH bulb. Save the cap for proper long-term storage. Unscrew cap and remove electrode from handle. Be careful that the O-ring on the electrode does not fall off. Inspect electrode for damage.
2. Wash the membrane and liquid junction area in distilled water to remove any salt deposits from the exterior of the electrode. Slide fill hole cover down.
3. Check that the reference filling solution is no less than 1cm below the fill hole. If required, fill with Orion 900014.
4. Reinsert electrode into handle and screw cap on.
5. Place the O-ring packaged with the blade over the electrode bulb until it is seated under the threaded end of the handle shaft.
6. Gently screw the blade onto the threads covering the O-ring.
7. Do not tip the electrode while in use or fill solution will leak out into the KNIpHE handle.

Calibration and Measurement Procedure

(For detailed calibration procedure, consult your pH meter manual.)

1. Connect the KNIpHE pH electrode to the meter.
2. Select two pH buffer solutions which bracket the expected sample pH value. One being pH 7, the second being either pH 4 or pH 10.
3. Rinse the combination electrode with deionized water and place in pH 7 buffer. Allow the meter to stabilize and calibrate as per instruction manual.
4. Rinse the electrode with deionized water and place in second buffer (either pH 4 or pH 10). Wait for a stable reading and calibrate.
5. Rinse the electrode with deionized water and place in sample. Allow time for stabilization and record pH reading.

Electrode Storage

Overnight (short term) - Soak electrode in Orion Electrode Storage Solution (Orion 910001).

Long term. - Replace electrode storage cap containing Orion Electrode Storage Solution.

Maintenance

General Cleaning Procedures

Soak electrode in 0.1 Molar HCl for 30 minutes followed by soaking in Orion Electrode Storage Solution for two hours. Orion offers cleaning kits (Orion 900020) to maintain the working order of the electrode.

Practical Information

1. Always keep the pH bulb wet.
2. Always use freshly prepared pH buffers each day. Store the buffers in sealed containers between each calibration during the day.
3. Care should be taken to avoid handling the pH bulb. Any damage to the surface, such as abrasion, may cause inaccuracies and a slow response time.
4. The electrical connections, termination, etc., must be kept clean and dry. Failure to do so will result in a loss of insulation, producing inaccurate results or total failure.
5. All buffers and samples should be approximately the same temperature when measuring pH. If this is not possible, then it is strongly recommended that a pH meter equipped with automatic temperature compensation be used.

Ordering Information Orion

KNIpHE	7120
Filling Solution (Pkg. of 5)	900014
Replacement pH electrode	7121
Replacement blade	712001
Optional protective sheath	712002

Product Specifications

pH Range:	0 – 14 pH
Temperature Range:	0 – 60°C
Type Reference:	Calomel
Junction:	Single
Dimensions:	215 mm x 25 mm (Assembled)

For Technical Assistance

In the United States or Canada: 800-225-1480

Elsewhere, contact your authorized Orion dealer.

Environmental Instruments

Water Analysis

For updated contact information, visit www.thermo.com

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