
Application Bulletin

Of interest to: Cheese dairies
Agricultural research institutions
Food analysis laboratories

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Measuring the pH value of dairy products

Summary

This bulletin describes methods for measuring the pH value of dairy products. Particular attention has been paid to the handling, maintenance and storage of the pH electrodes.

Electrodes

For liquid and viscous dairy products

- 6.0219.100 combined double junction pH glass electrode with sleeve diaphragm or
- 6.0258.000 LL Unitrode with fixed ground sleeve diaphragm and integrated Pt 1000 temperature sensor or
- 6.0235.100 LL Porotrode with double capillary diaphragm
- Electrolyte solution for the reference system of the electrode: 6.2308.040 Idrolyte

When working with the Porotrode, the 6.2318.000 Porolyte should be used as reference electrolyte.

For penetration measurements in cheese

- 6.0226.100 combined LL penetration pH glass electrode with polymer electrolyte and pinhole diaphragm

pH measurement

Measurements in milk, cream, yoghurt, etc.

- The calibrated pH electrode is immersed in a suitable quantity of the sample so that the diaphragm is completely submerged. If a temperature sensor is connected to the pH meter, temperature measurement will be carried out automatically, otherwise the temperature must be registered manually.

Important: Only pH values measured at the same temperature can be compared with one another.

- As measuring instrument, we recommend use of the 713 pH Meter (automatic temperature compensation of various buffer types during calibration; automatic electrode test; data output conforming to GLP) or the 744 pH Meter (automatic temperature compensation of various buffer types during calibration).

Measurements in soft and new cheese

- A penetration pH electrode should be used for this application.
Important: Only pH values measured at the same temperature can be compared with one another.
- As measuring instrument, we recommend use of the portable 704 pH Meter.

Maintenance of the electrodes

The quality of your results depends on the condition of the electrode. For this reason it is of utmost importance that you regularly examine the pH electrode to ensure that it is functioning properly.

1. Calibration

- Important information about the condition of the pH electrode is achieved by calibrating it daily. If the slope of the pH electrode is less than 95% and the zero point has shifted to more than 30 mV at pH = 7, the electrode must be regenerated.
- Buffer solutions remain stable for one to three months. Their stability depends on the temperature at which the solutions are stored, the type of buffer used and the existing exposure to contamination. After three months, or earlier if necessary, they definitely must be replaced. Used buffer solutions should not be poured back into the storage bottles. Buffer bottles must be closed tightly immediately after use.

2. Regeneration**2.1 pH electrodes with the exception of penetration electrodes**

- Electrodes contaminated with grease are thoroughly rinsed with ethanol. If they are contaminated with proteins, the electrolyte solution must first be sucked out of the reference system of the electrode by means of a plastic pipette. Do not close the electrolyte fill hole. Immerse the glass membrane and diaphragm of the pH electrode for ca. 2 h in a solution containing 5% pepsin in 0.1 mol/L HCl. After regeneration of the electrode, fill in fresh reference electrolyte (preferably Idrolyte) and rinse the outside of the electrode thoroughly with dist. water.
- The **Porotrode** should not be emptied before regeneration. Again the electrolyte fill hole must remain open during the cleaning process. Afterwards, rinse the electrode thoroughly with dist. water. Using a small syringe (without needle), upon which a short plastic tube has been attached, pressure is put on the reference electrolyte at the electrolyte fill hole until a drop of Porolyte clings to the capillary diaphragm. Thus, the diaphragm is rinsed thoroughly and possible residues of the pepsin solution are removed.

2.2 Penetration pH electrodes

- Now and then the pH glass membrane should be degreased. This is effected with ethanol or a grease-cutting rinsing solvent (dish washing agent). Attention must be paid, however, that only the membrane is rinsed and that the diaphragm does not come in contact with the regenerating solution. The electrode must afterwards be rinsed with dist. water.

3. Storage

- When the electrode is not in use it should always be stored in an electrode holder filled with electrolyte solution. It is also important that both the glass membrane and the diaphragm of the pH electrode are immersed in the electrolyte solution. Penetration electrodes are stored in saturated KCl solution (please use the supplied storage cap).
- Before placing the pH electrode into the electrolyte solution for storage, possible residues of the sample have to be removed. For this the electrode is thoroughly rinsed with dist. water or, if necessary, with an organic solvent. Dry the cleaned electrode carefully by dabbing it gently with a paper towel (never rub!).
- In general the rule applies that during storage the electrolyte fill hole of the electrode must always be closed and during the measurement it must always be open.