

## Application Bulletin 86/3 e

# Measuring the pH value of dairy products

### Branch

General analytical chemistry; food, stimulants, beverages, flavours

### Keywords

Dairy products; pH; branch 1; branch 7; Porotrode; Spearhead electrode

### Summary

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

## pH measurement

### Instruments

- pH meter

### Electrodes

Porotrode	6.0235.200
Unitrode with Pt 1000	6.0258.000
Profitrode	6.0255.100
Spearhead electrode (cheese)	6.0226.100
Temperature sensor	6.1114.010

### Reagents

- Buffer solution pH = 4.0, (6.2307.100)
- Buffer solution pH = 7.0, (6.2307.110)

### Solutions

Electrolyte Porotrode	Porolyte (6.2318.000)
Electrolyte Unitrode and Profitrode	Idrolyte (6.2308.040)

### Electrode calibration

The electrode is calibrated using the buffer solution pH = 4.0 and pH = 7.0.

### Analysis

#### *Milk, cream, yoghurt*

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.

#### *Cheese*

For cheese the spearhead electrode has to be used.

**Important:** For a comparison of the pH values of different samples, the pH has to be measured at the same temperature, due to the temperature dependency of the pH value.

## Maintenance of the electrodes

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

### 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 more than  $\pm 30$  mV at pH = 7, the electrode must be maintained.
- Buffer solutions should only be used within the expiry date and the recommended storage time after opening. Buffer solutions must not be reused.

### Maintenance

#### *Unitrode, Profitrode*

- Electrodes contaminated with fat are thoroughly rinsed with ethanol. If they are contaminated with proteins, the electrolyte solution must first be aspirated 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 approx. 2 h in a solution containing 5% pepsin in  $c(\text{HCl}) = 0.1 \text{ mol/L}$ . After maintenance of the electrode, fill in fresh reference electrolyte (preferably Idrolyte) and rinse the outside of the electrode thoroughly with dist. water.

#### **Porotrode**

- 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.

#### **Spearhead electrode**

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

#### **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.
- The **spearhead electrode** is 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.
- 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.

#### **Comments**

- See Application Bulletin No. 87 for the analysis of dairy products and Application Bulletin No. 235 for the determination of calcium and magnesium in dairy products.

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