

# METTLER TOLEDO APPLICATION NOTE

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## pH Measurement In Fresh Milk

### BACKGROUND

Fresh milk has a pH value of 6.6 to 6.8; when stored, it has a tendency to become more acidic. As soon as the pH falls below a specific value, the milk will no longer be marketed for direct consumption but rather will be processed into any of a large number of milk products. Reliable pH measurement is therefore crucial for quality control of fresh milk.

### THE PROCESS

Contamination of the diaphragm with native or precipitated proteins is likely when measuring pH in milk. This causes unpredictable changes in the calibration values (the zero point and slope) of the pH electrode. Also, the pH electrode must be able to withstand the harsh cleaning procedures to which storage vessels and pipelines are regularly subjected, while experiencing very little drift in its calibration values (less than 0.1 pH units per week).

#### *Calibration and temperature dependence*

The measuring assembly is typically calibrated every other week. Rinse the electrode thoroughly in a stream of distilled or deionized water. Immerse in a calibration buffer until the electrode reaches the buffer's temperature; then calibrate the electrode in buffers pH 7 and pH 4.

Note the striking temperature dependence of the pH of sterilized fresh milk, shown in the table below:

<u>Temperature °F</u>	<u>pH value</u>
48 °F	pH 6.82
68 °F	pH 6.73
86 °F	pH 6.68
104 °F	pH 6.53

Equally striking will be the measurement errors if the temperature of the calibration buffers is not controlled. The pH buffers must be brought to the measurement temperature of the milk before calibration begins.

### INSTRUMENTATION

To meet these demanding process requirements, we recommend the rugged InPro<sup>®</sup> 2000 with FRISCOLYT-B<sup>™</sup> reference electrolyte. This liquid-filled sensor with built-in RTD for automatic temperature compensation and Vario Pin quick disconnect cable connector is particularly suitable for the harsh conditions of this process while maintaining reliable pH measurements. The InPro 2000 should be mounted into an InFit<sup>®</sup> 764-50CIP housing to ensure that the strict hygienic standards are met. The 2100 pH Analyzer is also recommended for this application.

When this system is not in use, store the electrode in FRISCOLYT-B. Every 3 to 4 months, the diaphragm of the electrode should be cleaned by immersing it in METTLER TOLEDO diaphragm cleaner for 1-3 hours. Then rinse the electrode with distilled water and recalibrate.

## PRODUCTS

### 2100 pH Analyzer

- Detachable front panel and plug-in terminals for ease of installation
- All functions accessible through the keypad for increased ease of use
- Continuous sensor and transmitter diagnostics to monitor performance
- FM certification for Class I, Div 1 & 2 Environments and CSA General Purpose Approval
- 3 year warranty

### InPro<sup>®</sup> 2000 Combination pH Electrode

- Refillable for increased electrode lifetime and reduced maintenance
- Liquid-fill design ensures fast response, highest accuracy and reliability
- Silver ion trap to minimize electrode contamination
- Integral RTD for higher measurement accuracy
- Rugged IP67 rated quick connect VarioPin connector

### InFit<sup>®</sup> 764-50CIP Stationary Housing

- For highest standards of hygiene
- EHEDG and 3A Certificate for CIP Applications
- Ease of installation provides reduced maintenance
- In-situ sterilizable for hygienic applications