

# Titration of Acidity in milk

## Description

This method is used for the determination of acidity (acid degree) in milk and milk products. The acidity is calculated either as SH-, Domic- or Therner degree. Different NaOH concentrations are used for the different units. The degrees describe the consumption of a defined NaOH solution per 100 ml of milk.

$^{\circ}\text{SH} = \text{ml}_{\text{NaOH } 0,25 \text{ mol/l}} / 100 \text{ ml milk}$

$^{\circ}\text{D} = \text{ml}_{\text{NaOH } 0,111 \text{ mol/l}} / 100 \text{ ml milk}$

$^{\circ}\text{Th} = \text{ml}_{\text{NaOH } 0,1 \text{ mol/l}} / 100 \text{ ml milk}$

## Instruments

|               |                                          |
|---------------|------------------------------------------|
| Titration     | TL 5000 or higher                        |
| Electrode     | N 62 or A 162 2M-DIN-ID or similar       |
| Cable         | L1A (only for electrodes with plug head) |
| Stirrer       | Magnetic stirrer TM 235 or similar       |
| Lab accessory | Glass beaker 50 ml                       |
|               | Magnetic stirrer bar 30 mm               |

## Reagents

|                                                       |                                                                           |
|-------------------------------------------------------|---------------------------------------------------------------------------|
| 1                                                     | Sodium hydroxide solution 0.25 (SH), 0.111 (Domic) or 0.1 mol/l (Therner) |
| 2                                                     | DIN/NIST buffer pH 4.01 or technical buffer 4.00                          |
| 3                                                     | DIN/NIST buffer pH 6.87 or technical buffer 7.00                          |
| 4                                                     | KCl solution 3 mol/l                                                      |
| 5                                                     | Soda lime                                                                 |
| All reagents should be of analytical grade or better. |                                                                           |

## Titration procedure

### Reagents

#### NaOH 0.1 or 0.111 or 0.25mol/L

NaOH is available as a ready-to-use solution.

Caustic soda quickly absorbs CO<sub>2</sub> from the air and thus becomes unusable. The solution must therefore be protected from CO<sub>2</sub> with a CO<sub>2</sub> absorbent such as soda lime. For this purpose, a dry tube filled with soda lime is placed on the storage bottle.

The titer is determined as described in the application "Titer NaOH".

### Cleaning and storage of the electrode

The electrode is cleaned with distilled water. The L300 electrolyte solution is suitable for storing the electrode. The electrode must be calibrated regularly (weekly), e.g. with the buffers pH 4 and pH 7. Electrodes with a slope <95% must be replaced.

### Sample preparation

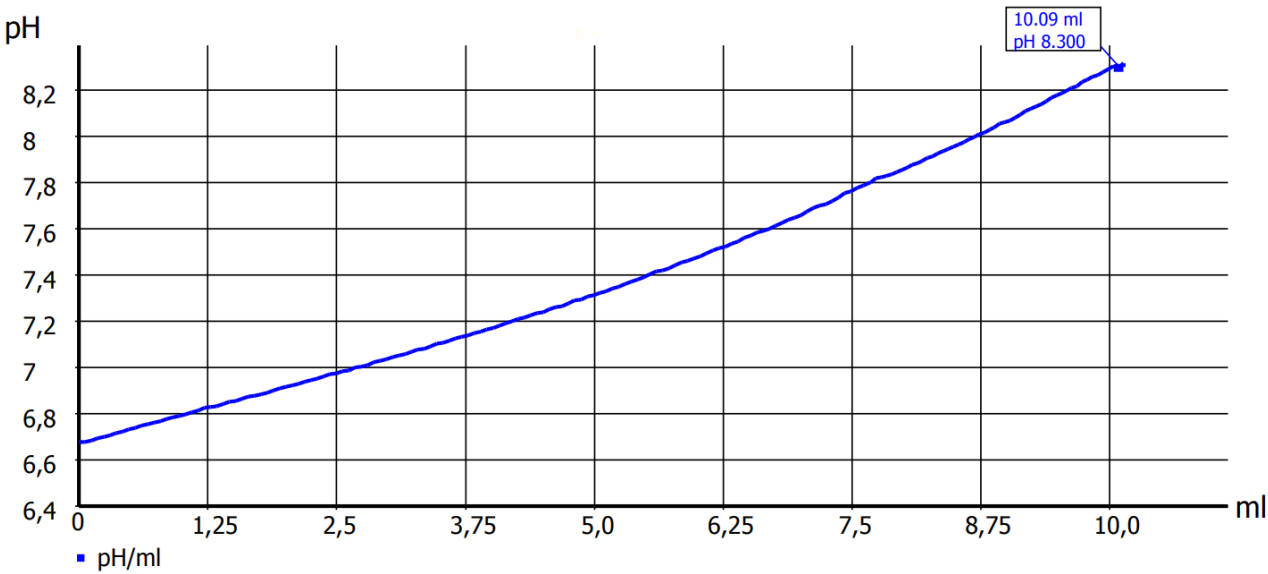
10 - 100 ml (depending on the acidity, for fresh milk 25 – 50 ml are well suited) of the sample are pipetted in a beaker. For °D and °Th twice the amount distilled, CO<sub>2</sub> – free water is added. The titration is done with Sodium hydroxide to the endpoint pH 8.3 (or another endpoint, depending on the norm). The Sample amount and concentration of the NaOH depends on the norm:

| Unit     | C <sub>NaOH</sub><br>[mol/l] | Dilution with water<br>Sample : water |
|----------|------------------------------|---------------------------------------|
| °SH      | 0.25                         | -                                     |
| °Dornic  | 0.11                         | 1 : 2                                 |
| °Therner | 0.1                          | 1 : 2                                 |

It is also possible to titrate °SH or °Dornic with 0.1 mol/l NaOH, but the concentration of the NaOH must be taken in consideration in the calculation. The calculation in this application note considers the concentration of NaOH.

Titration parameter

Sample titration



|                         |                     |                      |           |
|-------------------------|---------------------|----------------------|-----------|
| Default method          | ---                 |                      |           |
| Method type             | Automatic titration |                      |           |
| Modus                   | Endpoint            |                      |           |
| Measured value          | pH                  |                      |           |
| Measuring speed / drift | normal              | Minimum holding time | 2 s       |
|                         |                     | Maximum holding time | 15 s      |
|                         |                     | Measuring time       | 2 s       |
|                         |                     | Drift                | 20 mV/min |
| Initial waiting time    | 0 s                 |                      |           |
| Step size               | 0.05 ml             |                      |           |
| Dampening               | none                | Titration direction  | increase  |
| Pretitration            | Off                 | Delay time           | 0 s       |
| Endpoint 1              | 8.30 pH             | Delta Endpoint       | 1.0 pH    |
|                         |                     | Endpoint delay       | 10 s      |
| Endpoint 2              | Off                 |                      |           |
| Max. titration volume   | 20 ml               |                      |           |
| Dosing speed            | 20%                 | Filling speed        | 30 s      |

#### Calculation:

The result is calculated as degree SH:

$$^{\circ}SH = \frac{(EP1 - B) * T * M * F1}{V * F2}$$

|     |      |                                         |
|-----|------|-----------------------------------------|
| EP1 |      | Consumption of titrant at the end point |
| B   | 0    | Blank value                             |
| T   | WA   | Actual concentration of the titrant     |
| M   | 1    | Molecular weight                        |
| V   | m    | Volume of the sample                    |
| F1  | 100  | Conversion factor                       |
| F2  | 0,25 | Conversion factor                       |

For calculation as degree Dornic (°D) set F2 = 0.111

For calculation as degree Thoenen (°Th) set F2 = 0.1