



## Application Note AN-T-133

# Chloride in milk and milk powder

Fully automated determination according to ISO, IDF, and AOAC standards

To maintain product quality, the sodium chloride content in dairy products must be monitored and not exceed the limits defined by the respective public health authorities. The chloride content in food correlates with the salt content, its determination is therefore described in various norms and standards. However, preparation of such samples is time consuming, as it includes a chloride extraction with warm water. Whole milk powders in particular are difficult to handle as an inhomogeneous

dispersion of fat in the titration suspension occurs.

In order to reduce the workload, increase sample throughput, and eliminate the matrix challenges posed by high fat products, this Application Note presents a fully automatic potentiometric titration of chloride with silver nitrate in milk and milk powder based on ISO 21422, IDF 242, AOAC 2015.07, AOAC 2015.08, and AOAC 2016.03.

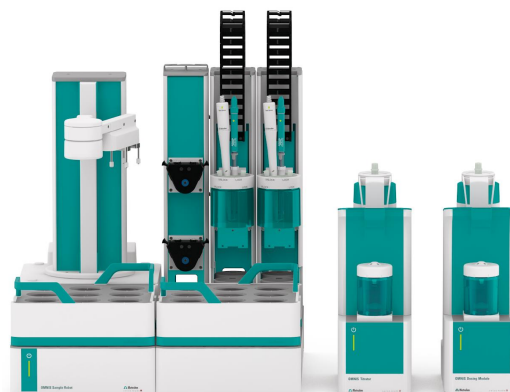
## SAMPLE AND SAMPLE PREPARATION

The method is demonstrated for different milk and milk powders: toddler and whole milk powder, milk, salted dairy beverage (e.g., ayran,

doogh), and protein shake. All samples are well-mixed before use.

## EXPERIMENTAL

This analysis is performed on an automated system consisting of an OMNIS Advanced Titrator and an OMNIS Sample Robot S equipped with a dProfitrode and a dAg-Titrode. Warm water is added to a reasonable amount of sample. For samples with high fat content, some isopropanol is additionally added. The pH is adjusted with nitric acid to below pH 1.5. The sample is titrated with standardized silver nitrate until after the equivalence point. For automated rinsing of electrodes and burets, isopropanol is used.



**Figure 1.** OMNIS Sample Robot S, OMNIS Dosing Module and OMNIS Advanced Titrator equipped with dProfitrode and dAg-Titrode for the determination of chloride content.

## RESULTS

The analysis demonstrates acceptable results and well-defined titration curves. The results are

displayed in **Table 1**.

**Table 1.** Mean chloride content of various milk and milk powder products determined with an automated OMNIS system (n = 6).

	Chloride content in mg/100 g sample	SD(rel) in %
Whole milk powder	832.9	0.2
Toddler formula powder milk based	293.7	0.3
Salted dairy beverage	411.8	0.2
Protein shake	88.4	2.7
Organic milk	99.3	0.5

## CONCLUSION

Titration is a precise and reliable method to determine the chloride content in dairy products according to various international standards. Utilization of an OMNIS Sample Robot allows a fully automated determination of up to four samples in parallel, freeing up valuable time of

the operator and thus increasing the productivity in the lab. The OMNIS system offers the opportunity to customize the system according to your needs, and expand it for other required titration applications on dairy products, such as the Ca / Mg content or acidity.

Internal reference: AW TI CH1-1264-112018

## CONTACT

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## CONFIGURATION



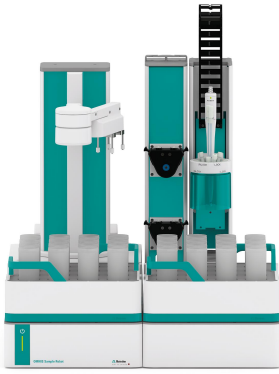
### OMNIS Advanced Titrator

新型、模式位分析 OMNIS Titrator 滴定,用于行点和等当点滴定(一/)。由于采用 3S 瓶配器技,理化学用品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台拌器。在需要可以通相的件功能可平行滴定升 OMNIS Advanced Titrator。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 可以展磁力拌器和/或螺旋拌器
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的瓶配器:安全理化学用品,自生商的原

#### 量模式和件:

- 点定滴定:“Basic” 功能可
- 点和等当点滴定(一/):“Advanced” 功能可
- 点和等当点滴定(一/),包括平行滴定
- “Professional” 功能可



### OMNIS Sample Robot S Pick and Place

OMNIS Sample Robot S 具有一个“蠕”模(2 通道)和一个 Pick&Place 模以及大量附件,可直接入全自滴定。此系具有个品位置,可用于 32 个 120 mL 的品。此模化系供已完全安装完,因此可在短内投入行。

系也可根据需要展配外台蠕以及多加一个 Pick&Place 模,由此使通量翻倍。如果需要更多工作台,可将此 Sample Robot 展 L 格款型的 OMNIS Sample Robot,由此可使七个品的品在多四个 Pick&Place 模上并行理,将品通量大四倍。



### OMNIS Dosing Module

用于与 OMNIS Titrator 滴定相的加液模,以展外用于滴定/加液的滴定管。可以展磁力拌器和/或螺旋拌器,以作独的滴定台使用。可自由 5、10、20 或 50 mL 量管元。



### dAg Titrode

pH 玻璃膜的 OMNIS 用数字合式形,用作参比。

免用于 pH 恒定的滴定(硝酸滴定),例如:

- 化物、化物、化物
- 硫化物
- 硫化
- 硫醇
- 化物

存放在蒸水中。

dTodes 可在 OMNIS Titratoren 上使用。



### Profitrode 12.5 cm

双系的合 pH ,安装度 11.3 cm。此用于品的 pH 量 / 滴定,

- 染传感器的参比系(例如,浴液、含硫化物的品)
- 其中化  $c(\text{KCl}) = 3 \text{ mol / L}$  不能用作参比解(例如,或化物与品的反)

此配了可以抵抗染的活磨口隔膜,如有必要可以更。  
当使用  $c(\text{KCl}) = 3 \text{ mol / L}$  作外参比液解,建在保存液中存。

中解可以用合的解(例如硝酸  $c(\text{KNO}_3) = 1 \text{ mol/L}$  (6.2310.010))代替。存在用的解中。

以下物品号的 Profitrode 有更多度的版本可供:

- 6.0255.110:度 17.8 cm
- 6.0255.120:度 31.0 cm