



Application Note AN-T-133

牛奶和奶粉中的氯化物

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

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

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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.

CONTACT

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CONFIGURATION



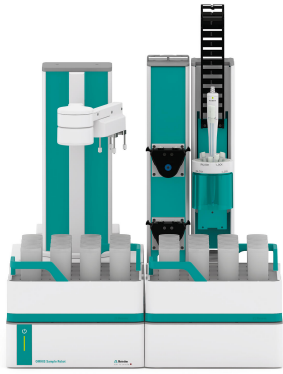
OMNIS Advanced Titrator

创新型、模块式电位分析 OMNIS Titrator 滴定仪,用于进行终点和等当点滴定(单一/动态)。由于采用 3S 试剂瓶适配器技术,处理化学品很安全。可以使用测量模块和计量管单元自由配置滴定仪,并在需要时扩展一台搅拌器。在需要时可以通过相应的软件功能许可证为平行滴定升级 OMNIS Advanced Titrator。

- 通过计算机或本地网络控制
- 可以为其他应用或辅助溶液另外连接四个滴定模块或加液模块
- 可以扩展磁力搅拌器和/或螺旋搅拌器
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的试剂瓶适配器:安全处理化学品,自动传输生产商的原始试剂数据

测量模式和软件选项:

- 终点设定滴定:“Basic” 功能许可证
- 终点和等当点滴定(单一/动态):“Advanced” 功能许可证
- 终点和等当点滴定(单一/动态),包括平行滴定:“Professional” 功能许可证



OMNIS Sample Robot S Pick and Place

OMNIS Sample Robot S ""(2) Pick&Place ,, 32 120 mL ,

Pick&Place ,, Sample Robot L OMNIS Sample Robot, Pick&Place ,



OMNIS Dosing Module

OMNIS Titrator ,//, 51020 50 mL



dAg Titrode

pH OMNIS ,

pH (),:
-
-
-
-
-

dTodes OMNIS Titratoren

Profitrode 12.5 cm

pH , 11.3 cm pH / ,

- (,)

- c(KCl)= 3mol / L (,)

,

c(KCl) = 3 mol / L ,

(c(KNO₃) = 1 mol/L (6.2310.010))

Profitrode :

- 6.0255.110: 17.8 cm

- 6.0255.120: 31.0 cm

