

Application Note AN-T-233

通滴定法定焦酸

Fast and accurate potentiometric determination of pyrophosphates in aqueous samples

Pyrophosphates, also known as diphosphates, are mainly used in food chemistry applications as emulsifiers. They also have other useful properties as preservatives, antioxidants, release agents, and leavening agents. Pyrophosphates can also act as complexing agents and acidity regulators and therefore have a wide range of uses.

However, pyrophosphates should only be used in limited quantities as they can cause severe

allergic reactions as well as lead to the onset of osteoporosis. The determination of pyrophosphate content in food and beverage products is therefore of interest.

In this Application Note, the pyrophosphate content in aqueous samples is accurately and reliably analyzed by automated titration using the OMNIS Sample Robot S and the OMNIS Titrator equipped with a dUnitrode.

SAMPLES AND SAMPLE PREPARATION

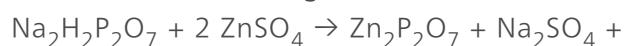
This application is demonstrated on different samples from potato processing baths. Sample

preparation is not required.

EXPERIMENTAL

An appropriate amount of sample is weighed into the titration beaker and deionized water is added. The pH is measured and then adjusted to between pH 3 and 6 if necessary.

In the first step after adding zinc sulfate, a pyrophosphate-complex and sulfuric acid are formed via the following reaction mechanism:



In the second step, the formed sulfuric acid is titrated with sodium hydroxide to determine the pyrophosphate content in the sample.

The determination is carried out with an OMNIS Titrator equipped with a dUnitrode on an OMNIS Sample Robot S (Figure 1).



Figure 1. OMNIS Sample Robot S equipped with an OMNIS Titrator, Dosing module, and dUnitrode electrode for the automated determination of pyrophosphate in aqueous samples.

RESULTS

This method offers very accurate results, as

displayed in **Table 1** and **Table 2**.

Table 1. Results of pyrophosphate determination in different aqueous samples.

Sample (n = 3)	Pyrophosphate in %	SD(rel) in %
1	7.48	0.0
2	5.32	0.1
3	9.84	0.1
4	8.48	0.1
5	15.87	0.3

Table 2. Results of pyrophosphate determination in the samples from Table 1 – each spiked with 5.0 g/L Na₂H₂P₂O₇.

Sample with spike (n = 3)	Expected value in %	Recovery in %
1	12.48	99.2
2	10.32	100.0
3	14.84	98.6
4	13.48	97.8
5	20.87	101.4

CONCLUSION

Titration is an accurate and precise method that can be used to determine the pyrophosphate content in aqueous products. The OMNIS Titrator equipped with a dUnitrode delivers

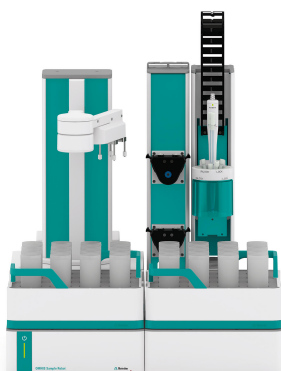
reliable determinations. This automated system offers flexible analyses combined with high-end software.

CONTACT

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CONFIGURATION



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 Professional 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,理化学品很安全。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。包括用于使用其他滴定或加液模平行滴定的“Professional”功能可。

- 通算机或本地网控制
- 可以其他用或助溶液外接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:安全理化学品,自生商的原
始数据

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