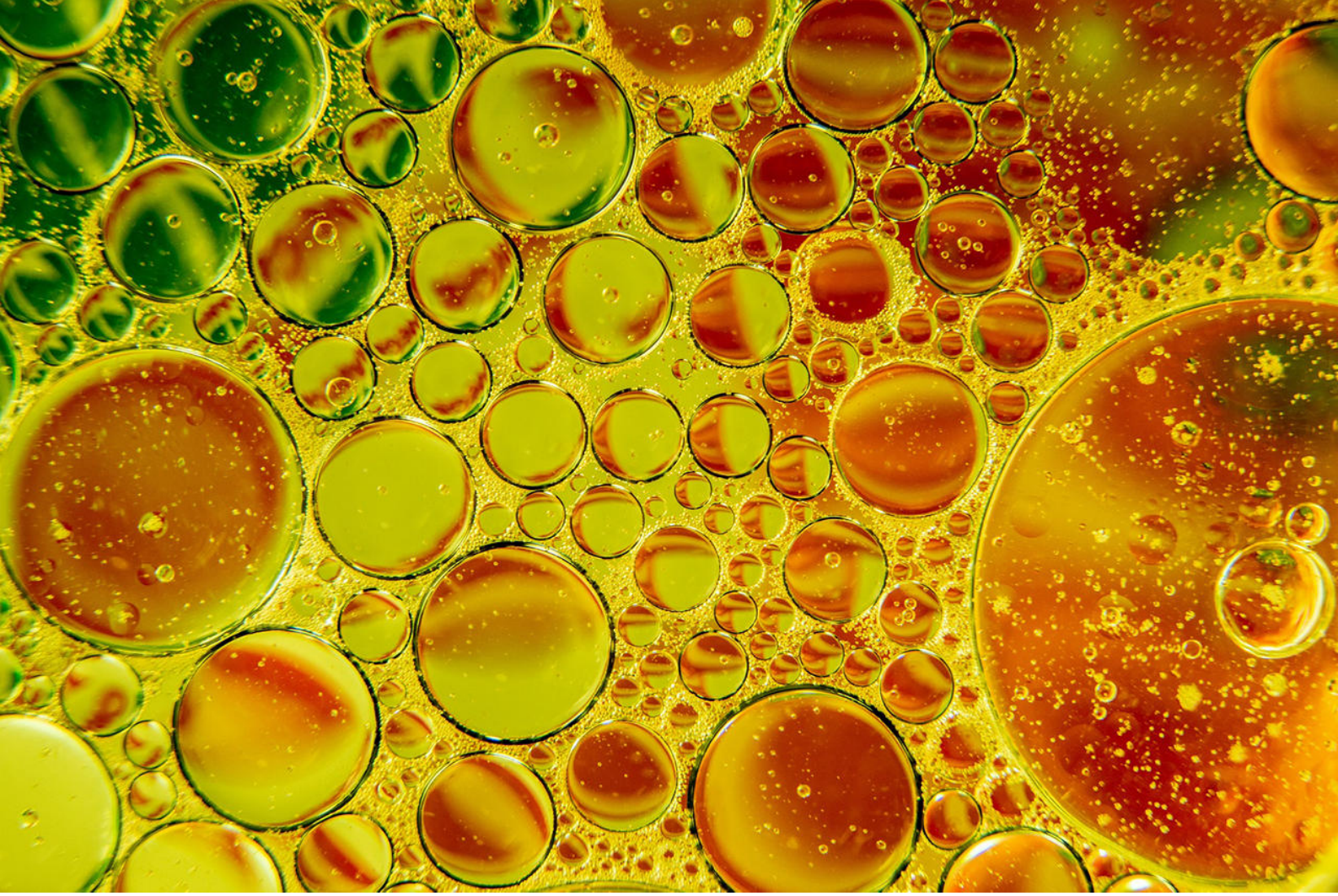


Application Note AN-T-233

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.

This application is demonstrated on different samples from potato processing baths. Sample preparation is not required.

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:

$Na_2H_2P_2O_7 + 2\ ZnSO_4 \rightarrow Zn_2P_2O_7 + Na_2SO_4 + H_2SO_4$

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 $Na_2H_2P_2O_7$.

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

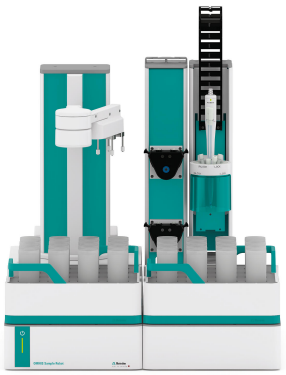
CONCLUSION

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

Metrohm AG
Ionenstrasse
9100 Herisau
info@metrohm.com

CONFIGURATION



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 Professional Titrator

OMNIS Titrator,(/) 3S OMNIS Liquid Adapter ,, “Professional”

-
-
- /
- :51020 50 mL
- 3S OMNIS Liquid Adapter:,

:

- :“Basic”
- (/):“Advanced”
- (/), 5 :“Professional”