Application Note AN-T-224

Aluminum content in coagulants and flocculants for wastewater treatment

Fast and accurate thermometric determination based on ABNT NBR 11176

Coagulation and flocculation are essential for treating both drinking water and wastewater. A common practice in overloaded wastewater treatment plants is chemically enhancing pre-cleaning to reduce suspended solids and organic loads from the primary clarifiers. Aluminum salts such as aluminum sulfate and polyaluminum chloride (PAC) are often used for this purpose.

For the precise application and exact dosage of the flocculant, it is important to accurately determine its aluminum content. The Al content, expressed as aluminum oxide (Al_2O_3), is also a parameter for calculating the precipitation capacity.

In this Application Note, the aluminum content is accurately and reliably analyzed based on ABNT NBR 11176 using an OMNIS Titrator equipped with a dThermoprobe HF and sodium fluoride as titrant.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on PAC (polyaluminum chloride) and aluminum sulfate.

No sample preparation is required.

EXPERIMENTAL

An appropriate amount of sample is weighed into the sample beaker. Deionized water, hydrochloric acid, and acetate buffer solution are added.

While stirring, the solution is titrated until after the first endpoint with standardized sodium fluoride solution.

The determination is carried out with an OMNIS Titrator equipped with a dThermoprobe HF (Figure 1).

Figure 1. OMNIS Titrator equipped with a dThermoprobe HF.

Table 1. Summarized results for aluminum in PAC (polyaluminum chloride) and aluminum sulfate samples expressed as Al2O3.

Sample (n = 5)	Mean value Al_2O_3 in %(m/m)	SD(rel) in %
PAC (polyaluminum chloride)	10.7	0.8
Aluminum sulfate	7.7	0.5

CONCLUSION

Thermometric titration is an accurate and precise method to determine the aluminum content in different flocculants quickly.

Using the OMNIS Titrator equipped with a dThermoprobe HF allows a reliable determination of Al. The system offers fast analyses and user-friendly handling.

Internal reference: AW TI BR8-0003-052014

CONTACT

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CONFIGURATION

OMNIS Titrator with magnetic stirrer, without function license

Innovative, modular potentiometric OMNIS Titrator for stand-alone operation or as the core of an OMNIS titration system. Thanks to 3S Liquid Adapter technology, handling chemicals is more secure than ever before. The titrator can be freely configured with measuring modules and cylinder units and can have a stirrer added as needed. Thanks to various software function licenses, various measuring modes and functionalities are possible.

- Control via PC or local network
- Connection option for up to four additional titration or dosing modules for additional applications or auxiliary solutions
- Connection option for one rod stirrer
- Various cylinder sizes available: 5, 10, 20 or 50 mL
- Liquid Adapter with 3S technology: Secure handling of chemicals, automatic transfer of the original reagent data of the manufacturer

Measuring modes and software options:

- Endpoint titration: "Basic" function license
- Endpoint and equivalence point titration (monotonic/dynamic): "Advanced" function license
- Endpoint and equivalence point titration (monotonic/dynamic) with parallel titration: "Professional" function license

dThermoprobe HF

High-sensitivity digital temperature sensor for thermometric titration with OMNIS in HF-containing media.

The Thermoprobe has a short response time and a high resolution, which enables precise recording of even the smallest temperature changes.

This sensor can be used in acidic, fluoride-containing solutions. It is suitable for:

- Determination of sodium
- Titration of etching baths

Cylinder unit OMNIS special, 10 mL

Intelligent 10 mL cylinder unit for one OMNIS Titrator, Titration Module or Dosing Module. This cylinder unit is especially recommended for the following solutions:

- Aqueous alkaline solutions
- Titrant 5
- Silver nitrate solutions
- Nonaqueous alkaline solutions
- Permanganate solutions
- EDTA solutions

Includes dosing tubing and antidiffusion tip.

OMNIS

A WHOLE NEW LEVEL OF PERFORMANCE

Function license Thermometric Titrator

Function license "Thermometric Titrator" for the OMNIS Titrator

Contains the function modes

- Thermometric Titration (TET)
- MEAS U/T/pH
- Liquid Handling
- Titration only with internal buret of an OMNIS Titrator