



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 an essential part of 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 additionally 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 the 859 Titrotherm equipped with a Thermoprobe 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 859 Titrotherm equipped with a Thermoprobe HF.



Figure 1. The 859 Titrotherm equipped with a Thermoprobe HF.

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

| Sample (n = 5) | Mean value Al ₂ O 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 859 Titrotherm equipped with a

Thermoprobe HF allows a reliable determination of aluminum. The system offers fast analyses and user-friendly handling.

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CONFIGURATION



859 Titrotherm complete with tiamo™

Computer-controlled titrator for thermometric titration. Including complete accessories for the titration (10 mL buret, titration stand with rod stirrer, Thermoprobe, titration vessel and tiamo™ light).



Thermoprobe HF

High-sensitivity temperature sensor for thermometric titrations with an 859 Titrotherm in HF-containing media.

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

This sensor can be used in acidic, fluoride-containing solutions but is not resistant to organic solvents. It is suitable for:

- the determination of sodium
- titration of etching baths