Application Note AN-I-014

Bromide in water

Fast and inexpensive determination according to ASTM D1246

Bromide is commonly found in nature along with chloride salts, such as sodium chloride, due to their similar physical and chemical properties. However, bromide is present in much lower quantities than chloride. Bromide concentrations in seawater are generally between 65–80 mg/L, whereas chloride concentration is about 300 times higher. The bromide concentration in fresh water is normally lower than 0.5 mg/L.

Wastewater of e.g. coal-fired power plants can contain elevated levels of total dissolved solids, including bromide, which is not easily removed by wastewater treatment plants. Furthermore, bromide can react with disinfectants used for drinking water treatment (e.g., ozone), forming brominated disinfectant byproducts, which are associated with increased cancer risk.

To assess the bromide concentration in surface water, ground water, and wastewater, a fast and inexpensive measurement of the bromide concentration can be performed by using an ion selective electrode.

SAMPLE AND SAMPLE PREPERATION

The method is demonstrated for water samples spiked with different concentrations of bromide (75 and 130 mg/L Br^-). No sample preparation was necessary.

EXPERIMENTAL

This analysis is carried out automatically on the 867 pH Module equipped with a bromide ion selective electrode, a reference electrode, and a temperature sensor. The ISE is calibrated prior to the analysis.
Ionic strength adjustor is added to the sample to fix the ionic strength. To homogenize the mixture, it is stirred for 1 minute. Afterwards, the sensors are placed into the sample and the bromide concentration is measured.

Figure 1. 867 pH Module for precise and reliable ion measurement after electrode calibration.

RESULTS

Results are taken after a minimum of 60 seconds when the concentration reading has stabilized. The obtained relative standard deviation is smaller than the 15% requested by the ASTM standard.

Table 1. Concentration of bromide in mg/L measured in spiked samples (n = 5).

	Mean Br^- content in mg/L	SD(abs) in mg/L	SD(rel) in %
Sample 1	75.5	0.5	0.6
Sample 2	129.7	1.1	0.8

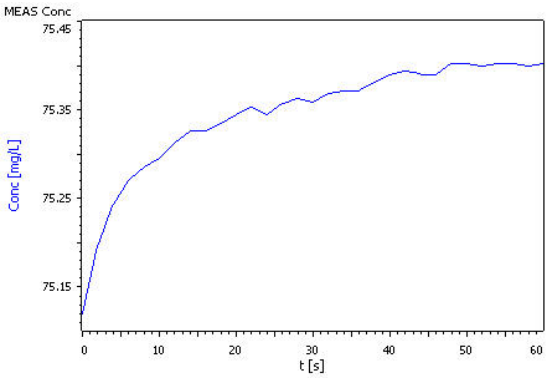

Figure 2. Example measurement curve of the bromide content determination.

CONCLUSION

The concentration of bromide can be determined quickly and inexpensively by using the ion measurement technique. With the described technique, concentrations between 0.5–1000 mg/L can be measured. Using an automated system helps to increase precision. Solutions are added accurately and you can save valuable time for other tasks, as the system runs autonomously.

Internal reference: AW ISE CH2-0159-042017

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CONFIGURATION

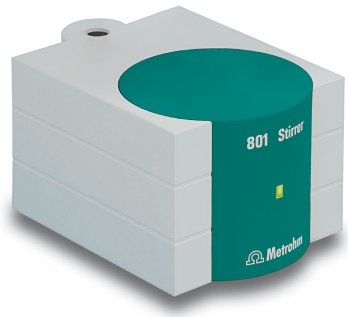
867 pH Module

Module for pH/ion measurement as supplement to a Titrando or "stand-alone" in combination with a 900 Touch Control.

In addition to measurements of pH, temperature, mV, Ipol, Upol and concentration, the pH Module can perform standard additions (manual, dos, autodos) and Liquid Handling (add, prep, empty). It enables the use of both conventional and intelligent sensors for measuring. Also integrated in the software is an automatic GLP-compliant pH electrode test.

The pH Module has two USB interfaces for connecting printers, barcode readers or sample changers and four MSB interfaces for stirrers or Dosinos (for the addition of auxiliary solutions or for standard addition).

For use with OMNIS Software, tiamo software, or Touch Control unit. Compliance with GMP/GLP and FDA regulations such as 21 CFR Part 11, if required.



801 Stirrer with stand

Magnetic stirrer including base plate, support rod and electrode holder for supplementing the Titrino plus, Dosimat plus, Titrandos, Sample Processors, 805 Dosimat and 780/781 pH meters as well as the 856 and 867 measuring modules. With permanently attached cable for MSB (Metrohm Serial Bus).

OMNIS

A WHOLE NEW LEVEL OF PERFORMANCE

OMNIS Stand-Alone license

Enables stand-alone operation of the OMNIS software on a WindowsTM computer.

Features:

- The license already includes one OMNIS instrument license.
- Must be activated via the Metrohm licensing portal.

Ion-selective electrode, Br

Bromide-selective electrode with crystal membrane.
This ISE has to be used in combination with a reference electrode and is suitable for:

- ion measurements of Br-
- ion measurements in small sample volumes (minimum immersion depth 1 mm)
- titrations

Thanks to the robust/break-proof plastic shaft made of EP, this sensor is mechanically very resistant.
The polishing set supplied enables easy cleaning and renewing of the electrode surface.

LL ISE reference electrode

Silver / silver chloride reference electrode with double junction system.
This reference electrode is well suited for:

- automated applications
- ion measurements
- surfactant titrations

The ground-joint diaphragm, which is insensitive to contamination, offers a constant and reproducible electrolyte outflow. Additionally, the reference electrolyte is gelified for even better signal stability.
The sensor is delivered with c(KCl) = 3 mol/L as bridge electrolyte, which can be freely selected and exchanged as needed.

Pt1000 temperature sensor (installation length 12.5 cm)

Pt1000 temperature sensor (class B) made of glass.
This PT1000 temperature sensor is also available under the article number 6.1110.110 with an installation length of 17.8 cm.