



Application Note AN-V-229

Antimony(III) in drinking water

Straightforward determination in the low ng/L range on the scTRACE Gold

SUMMARY

The toxicity of antimony depends on its oxidation state: antimony(III) is more toxic than antimony(V). Due to its carcinogenicity, EU legislation specifies 5 µg/L and the World Health Organization (WHO) sets a maximum concentration of 20 µg/L as the Sb(III) limit value in drinking water.

Straightforward determination using anodic stripping voltammetry provides a fast (analysis time under 10 minutes) and an ultra-sensitive tool for monitoring the antimony(III) concentration in drinking water. Already with a 30 s deposition time, the limit of detection is

around 0.1 µg/L and can be lowered even further. The linear range ends at ca. 20 µg/L. This determination is performed on the scTRACE Gold: a combined sensor containing working, reference, and auxiliary electrodes integrated on a single ceramic substrate. The scTRACE Gold electrode does not need extensive maintenance such as mechanical polishing. Measurements can be performed in the laboratory with the 884 Professional VA, or alternatively in the field with the 946 Portable VA Analyzer. This method is suited for manual or automated systems.

SAMPLE

Drinking water, mineral water, seawater

EXPERIMENTAL

The water sample and the supporting electrolyte are pipetted into the measuring vessel. The determination of antimony(III) is carried out with the 884 Professional VA or with the 946 Portable VA Analyzer using the parameters specified in **Table 1**. The concentration is determined by two additions of an antimony(III) standard addition solution. The scTRACE Gold is electrochemically activated prior to the first determination.



Figure 1. 946 Portable VA Analyzer



Figure 2. 884 Professional VA, fully automated for VA analysis

Table 1. Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Deposition potential	-0.1 V
Deposition time	30 s
Start potential	-0.1 V
End potential	0.2 V
Peak potential Sb(III)	0.06 V

ELECTRODES

- scTRACE Gold

RESULTS

At a 30 s deposition time, this method is suitable for the determination of antimony(III) in water samples in

concentrations from $\beta(\text{Sb(III)}) = 0.1\text{--}10 \mu\text{g/L}$.

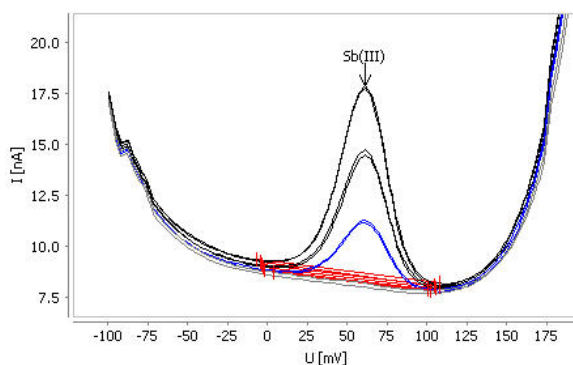


Figure 3. Determination of antimony(III) in tap water spiked with 1 $\mu\text{g/L}$ (30 s deposition time)

Table 2. Result

Sample	Sb(III) ($\mu\text{g/L}$)
Tap water spiked with 1 $\mu\text{g/L}$ Sb(III)	0.94

RESULTS

Internal references: AW VA CH4-0585-062019; AW

VA CH4-0586-072019

CONTACT

Metrohm Nordic AB
Box 11065
161 11 Bromma

mail@metrohm.se

CONFIGURATION



884 Professional VA manual for Multi-Mode Electrode (MME)

884 Professional VA manual for Multi-Mode Electrode (MME) is the entry-level instrument for high-end trace analysis with voltammetry and polarography with the Multi-Mode Electrode pro or the scTRACE Gold or the Bismuth drop electrode. The proven Metrohm electrode methods in combination with a high-performance potentiostat/galvanostat and the extremely flexible viva software open up new perspectives for the determination of heavy metals. The potentiostat with a certified calibrator readjusts itself automatically before each measurement, thus guaranteeing maximum precision.

Determinations with rotating disc electrodes can also be performed with the instrument, e.g. determinations of organic additives in electroplating baths with "Cyclic Voltammetric Stripping" (CVS), "Cyclic Pulse Voltammetric Stripping" (CPVS), and chronopotentiometry (CP). The replaceable measuring head enables rapid changes between the various applications with different electrodes.

The **viva** software is required for control, data collection, and evaluation.

The 884 Professional VA manual for MME is supplied with extensive accessories and a measuring head for the Multi-Mode Electrode pro. Electrode set and **viva** license need to be ordered separately.



VA electrode equipment with scTRACE Gold for Professional VA instruments

Complete electrode set for the determination of arsenic or mercury. Includes holders for scTRACE Gold, scTRACE Gold, stirrer and measuring vessel.



946 Portable VA Analyzer (scTRACE Gold)

Portable metal analyzer for the determination of heavy metals such as arsenic, mercury, copper, lead, zinc, nickel, cobalt, iron, bismuth or antimony in the trace range. Instrument version for the scTRACE Gold. The system is comprised of potentiostat and separate measuring stand with integrated stirrer and replaceable electrode. The instrument is operated with the Portable VA Analyzer software. The power is supplied via the USB connector and via the integrated rechargeable battery. The instrument is supplied with all required accessories in a carrying case.