



Application Note AN-V-228

Thallium in drinking water

Method using the scTRACE Gold modified with a silver film

Presence of thallium in surface water is an indicator of industrial effluents and poses a serious health hazard if imbibed. Monitoring of thallium concentration can easily be done with anodic stripping voltammetry on the silver film modified scTRACE Gold.

This non-toxic method allows the determination of thallium concentrations between 10–250 $\mu\text{g/L}$. The determination is carried out with the 946 Portable VA Analyzer. The main advantage of this procedure is the

unique design of the sensor, the scTRACE Gold electrode. It consists of a gold microwire working electrode, Ag/AgCl reference electrode, and a carbon auxiliary electrode on a ceramic substrate. The electrode is easy to handle and does not need extensive maintenance such as mechanical polishing. The possibility to re-plate the silver film allows a quick and easy regeneration of the sensor. This method is best suited for measurements in the field.

SAMPLE

Drinking water, mineral water, sea water

EXPERIMENTAL

Prior to the first determination, the silver film is deposited from a silver solution on the scTRACE Gold electrode. In the next step, the electrodes are cleaned with ultrapure water and the measuring vessel is emptied. The water sample and the supporting electrolyte with EDTA are pipetted into the measuring vessel. The determination of thallium is carried out with a 946 Portable VA Analyzer using the parameters specified in **Table 1**. The concentration is determined by two additions of a thallium standard addition solution.

The scTRACE Gold is electrochemically activated prior to the first determination.



Figure 1. 946 Portable VA Analyzer

Table 1. Parameters

| Parameter | Setting |
|----------------------|-------------------|
| Mode | SQW – Square wave |
| Deposition potential | -1.0 V |
| Deposition time | 90 s |
| Start potential | -1.0 V |
| End potential | -0.25 V |
| Peak potential TI | -0.62 V |

ELECTRODES

- scTRACE Gold

RESULTS

The method is suitable for the determination of thallium concentrations up to 150 µg/L. The limit of

detection with 90 s deposition time is approximately 10 µg/L.

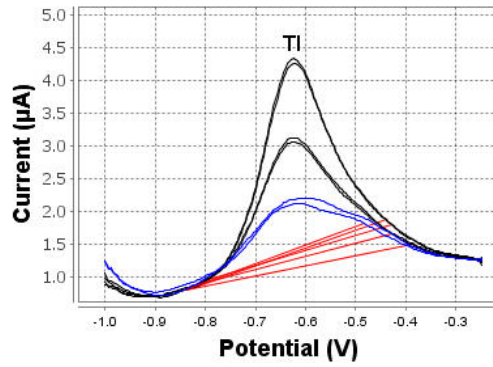


Figure 2. Determination of thallium in tap water spiked with 30 µg/L

Table 2. Result

| Sample | Tl (µg/L) |
|----------------------------------|-----------|
| Tap water spiked with 30 µg/L Tl | 30.7 |

Internal reference: AW VA CH4-0588-122019

CONTACT

Metrohm Nordic AS
 Sandviksveien 26
 1363 Høvik

firmapost@metrohm.no

CONFIGURATION



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.