



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.

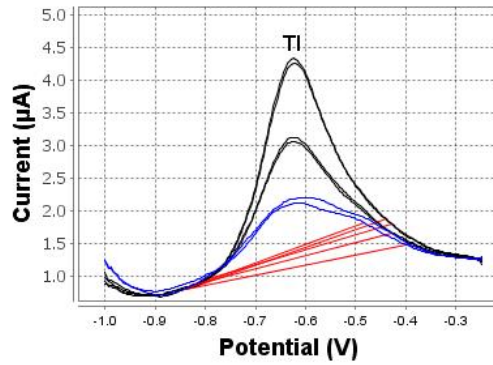


Figure 2. Determination of thallium in tap water spiked with 30 µg/L

Table 2. Result

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

Internal reference: AW VA CH4-0588-122019

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CONFIGURATION



946 Portable VA Analyzer (scTRACE Gold)

トレース範囲でヒ素、水銀、銅、鉛、亜鉛、ニッケル、コハルト、鉄、ヒスマスまたはアンチモンといった重金属測定するためのポータブル金属アナライザーです。この装置は scTRACE Gold のためのバージョンです。このシステムは、ポテンシostatと、内蔵スターラおよび交換可能な電極かついた別個の測定スタントから構成されています。本装置は、Portable VA Analyzerソフトウェアで操作します。電源は、USBコネクタおよび内蔵の充電式電池を介して供給されます。装置は、必要なすべての付属品がキャリッジケースに入れて納品されます。