



Application Note AN-V-234

Tellurium(IV) in drinking water

Direct determination in low $\mu\text{g/L}$ range on the scTRACE Gold

Tellurium is one of the elements recently identified as technologically critical for photovoltaic conversion, quantum dots, as well as in thermoelectric technology, and has the potential to become a new emergent contaminant. Until now there is no guideline value in the World Health Organization's «Guidelines for Drinking-water Quality» and in the European Drinking Water Directive for tellurium(IV) concentration in drinking water.

To monitor the tellurium(IV) levels in drinking water, anodic stripping voltammetry (ASV) performed on the unmodified scTRACE Gold is recommended. This method allows determination of tellurium(IV) in the

concentration range between $1 \mu\text{g/L}$ and $60 \mu\text{g/L}$ when using a 90 s deposition time.

The advantage of this method lies in the innovative and cost-effective sensor used for this application: the scTRACE Gold. It is a combined sensor containing the working, reference, and auxiliary electrode 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.

SAMPLE

Drinking water, mineral water

EXPERIMENTAL

The scTRACE Gold is electrochemically activated prior to the first determination. In the next step, the water sample and the supporting electrolyte are pipetted into the measuring vessel. The determination of tellurium(IV) 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 a tellurium(IV) standard addition solution.



Figure 1. 946 Portable VA Analyzer (scTRACE Gold)



Figure 2. 884 Professional VA, semiautomated for VA analysis

Table 1. Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Deposition potential	-0.3 V
Deposition time	90 s
Start potential	0.1 V
End potential	0.8 V
Peak potential Te	0.475 V

ELECTRODES

- scTRACE Gold

RESULTS

At a 90 s deposition time, this method is suitable for the determination of tellurium(IV) in water samples in concentrations of $\beta(\text{Te(IV)}) = 1\text{--}30 \mu\text{g/L}$ using the 884

Professional VA and $\beta(\text{Te(IV)}) = 2\text{--}75 \mu\text{g/L}$ using the 946 Portable VA Analyzer.

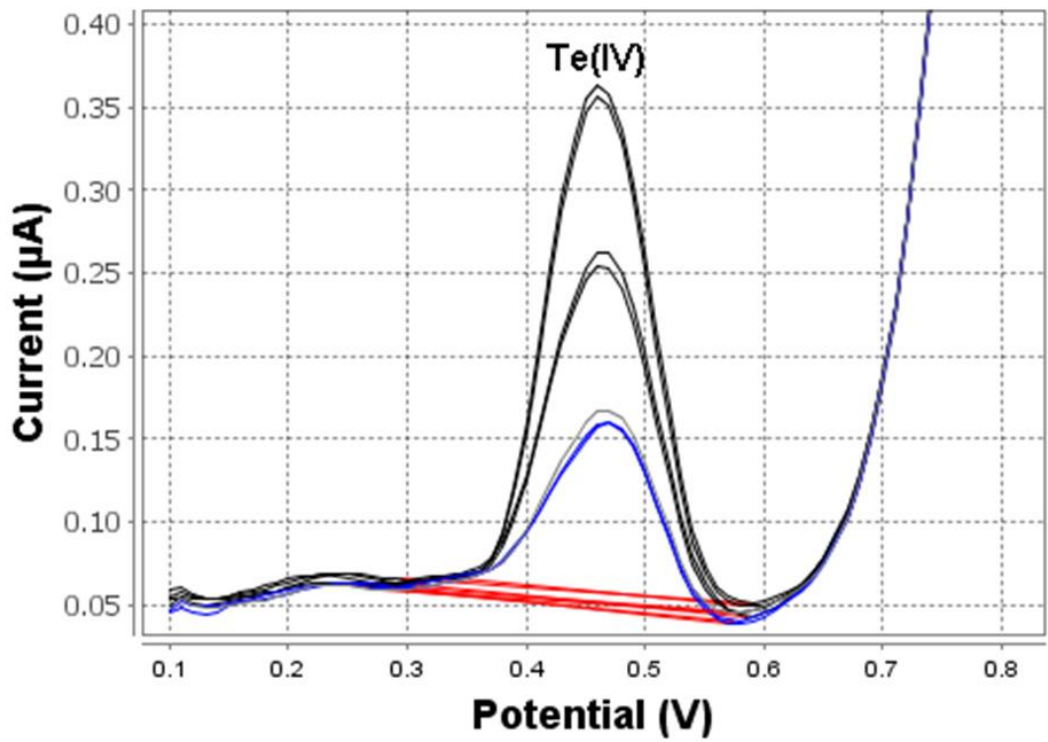


Figure 3. Determination of Te(IV) in mineral water spiked with 10 µg/L (946 Portable VA Analyzer; 90 s deposition time)

Table 2. Results of Te measured in a spiked mineral water sample

Sample	Te(IV) (µg/L)
Mineral water spiked with 10 µg/L	11.5

Internal references: AW VA CH4-0600-082020, AW

VA CH4-0602-092020

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946 Portable VA Analyzer (scTRACE Gold)

Analyseur de métaux portable pour déterminer les métaux lourds comme l'arsenic, le mercure, le cuivre, le plomb, le zinc, le nickel, le cobalt, le fer, le bismuth ou l'antimoine dans le domaine des traces. Version de l'appareil pour la scTRACE Gold. Le système comprend un potentiostat et un banc de mesure séparé avec agitateur intégré et électrode interchangeable. L'appareil fonctionne avec le logiciel du Portable VA Analyzer. L'alimentation électrique se fait par le connecteur USB et par la batterie rechargeable intégrée. L'appareil est livré dans une mallette contenant tous les accessoires nécessaires.