



Application Note AN-V-233

饮用水中的硒(IV)

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

The difference between the toxic and essential levels of selenium to human health are very slight. Therefore, the current provisional guideline value for selenium(IV) in the World Health Organization's «Guidelines for Drinking-water Quality» and in the European Drinking Water Directive is set to a maximum concentration of $10 \mu\text{g/L}$.

The anodic stripping voltammetric (ASV) technique performed on the unmodified scTRACE Gold can be used to determine concentrations as low as $0.5 \mu\text{g/L}$ selenium with a 30 s deposition time. These limits can be lowered even further by increasing the deposition time. The linear range at 30 s deposition time ends at approximately $100 \mu\text{g/L}$.

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. This method is suited for manual or automated systems.

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 selenium(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 an selenium(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	-0.375 V
Deposition time	90 s
Start potential	0.375 V
End potential	0.75 V
Peak potential Se	0.62 V

ELECTRODES

- scTRACE Gold

RESULTS

At a 30 s deposition time, this method is suitable for the determination of selenium(IV) in water samples in concentrations of $\beta(\text{Se(IV)}) = 0.5\text{--}50$

$\mu\text{g/L}$ using the 884 Professional VA and $\beta(\text{Se(IV)}) = 6\text{--}75 \mu\text{g/L}$ using the 946 Portable VA Analyzer.

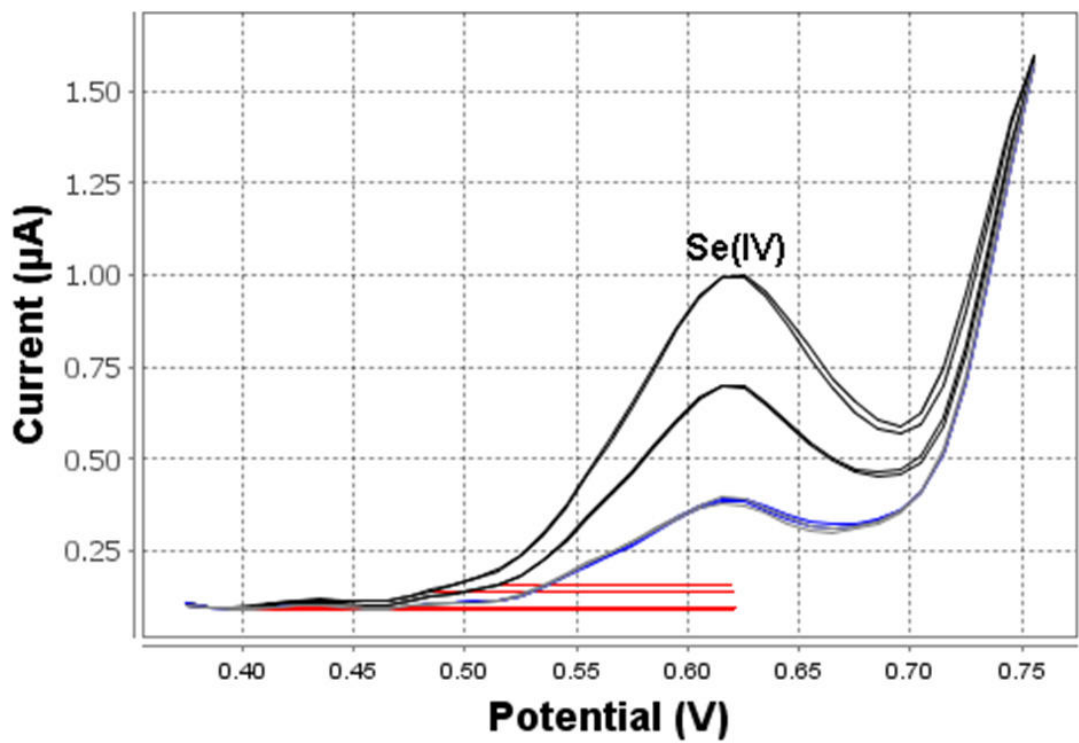


Figure 3. Determination of Se(IV) in mineral water spiked with 10 $\mu\text{g/L}$ (946 Portable VA Analyzer; 90 s deposition time)

Table 2. Results of Se measurement in spiked mineral water

Sample	Se(IV) ($\mu\text{g/L}$)
Mineral water spiked with 10 $\mu\text{g/L}$	10.22

Internal references: AW VA CH4-0598-082020,

AW VA CH4-0601-092020

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CONFIGURATION



(MME) 884 Professional VA manual

用于多模式电极 (MME) 的 884 Professional VA manual 是借助多模式电极 pro 或 scTRACE Gold 或 铋液滴电极使用伏安法和极谱法进行痕量分析的入门仪器。此项已经证实的瑞士万通电极技术与恒电位/恒电位仪以及外接的灵活 viva 软件联用,在重金属测定领域中展现了新的前景。带有经认证的校准器的恒电位仪在每次测量之前均自动冲洗进行校准,确保可能的高精度。

通过此仪器也可使用旋转圆盘电极进行测定,例如借助«循环伏安溶出法»(CVS)、«循环脉冲伏安溶出法»(CPVS)和计时电位法(CP)测定电镀池中的有机添加剂。借助可更换的测量头,可在使用不同电极的各种应用之间实现快速切换。

使用 **viva** 软件进行控制、数据采集和评估。

用于 MME(多模式电极)的 884 Professional VA manual 供货时配备大量附件,包括用于多模式电极 pro 的测量头。电极组和 **viva** 许可证则须单独订购。



VA scTRACE Gold Professional VA

整套电极组,用于测定砷或汞。包括用于 scTRACE Gold、scTRACE Gold、搅拌器和量杯的支架。



946 Portable VA Analyzer (scTRACE Gold)

用于测定重金属,如痕量砷,汞,铜,铅,锌,镍,钴,铁、铋或锑之类重金属的便携式金属分析器。scTRACE Gold 适用的仪器版本。该系统由恒电位仪和集成了搅拌器与可更换式电极的独立测量台构成。该设备用 Portable VA Analyzer 软件驱动。电源由 USB 接口和内置的可充电电池提供。设备装在手提箱内交付,包含所有必需的附件。