Application Note AN-V-231

用水中的和

Simultaneous determination on Metrohm DropSens Screen-Printed Carbon Electrodes

The provisional guideline values in the World Health Organization's (WHO) «Guidelines for Drinking-water Quality» are set to 3 µg/L for cadmium and 10 µg/L for lead.

The anodic stripping voltammetry (ASV) technique performed on the ex-situ mercury film modified Metrohm DropSens screen-printed electrode (SPE) can be used to simultaneously detect concentrations as low as 0.3 µg/L for both elements. This is suitable to monitor the WHO guideline values.

The main advantage of this method lies in the innovative and cost-effective screen-printed electrode. It is a combined sensor consisting of a carbon working electrode, Ag/AgCl reference, and carbon auxiliary electrode on a ceramic substrate. The disposable sensor does not need maintenance such as mechanical polishing or mechanical cleaning. It can be used conventionally in the laboratory with the 884 Professional VA, or alternatively in the field with the 946 Portable VA Analyzer. This method is best suited for manual systems.

SAMPLE

Drinking water, mineral water, sea water

EXPERIMENTAL

Prior to the first determination, the ex-situ mercury film is deposited in a separate step on the screenprinted electrode. The water sample and the supporting electrolyte are pipetted into the measuring vessel. The simultaneous determination of cadmium and lead is carried out with the 884 Professional VA or with the 946 Portable VA Analyzer using the parameters specified in Table 1. The concentration of both elements is determined by two additions of a cadmium and lead standard addition solution.

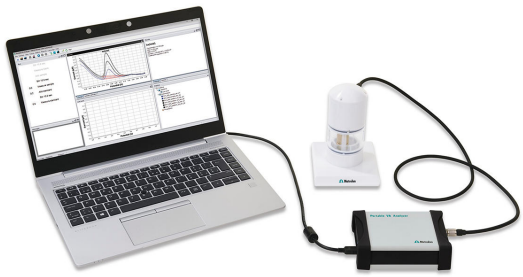

Figure 1. 946 Portable VA Analyzer (SPE)

Figure 2. 884 Professional VA, semiautomated system

Table 1. Parameters

Parameter	Setting
Mode	SQW – Square wave
Deposition potential	-1.3 V
Deposition time	60 s
Start potential	-1.0 V
End potential	-0.4 V
Peak potential Cd	-0.72 V
Peak potential Pb	-0.52 V

ELECTRODES

- Screen-printed carbon electrode (Metrohm DropSens 11L)

RESULTS

With a 30 s deposition time, the limit of detection is around 1 µg/L, and the linear working range is up to 20 µg/L in the measuring solution for both elements.

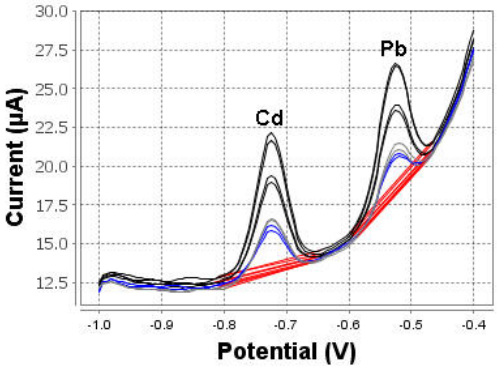

Figure 3. Determination in mineral water spiked with 2 µg/L cadmium and lead

Table 2. Result

Sample	Cd (µg/L)	Pb (µg/L)
Mineral water spiked with 2 µg/L Cd and Pb	2.04	1.81

Internal references: AW VA CH4-0593-042020; AW VA CH4-0594-042020

CONTACT

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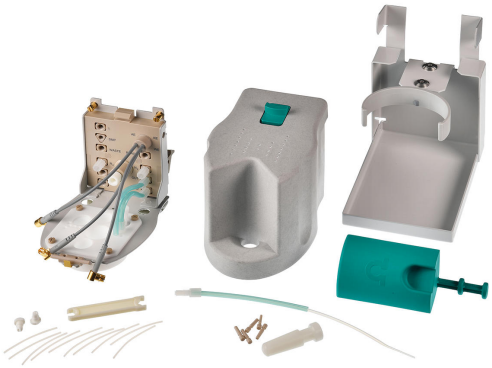
CONFIGURATION

884 Professional VA

884 Professional VA 是 Professional VA/CVS 器系列的通用入。与合的量和用,可使用伏安量和法借助多模式 pro、scTRACE Gold、液滴行痕量分析定,或通«循伏安溶出法»(CVS)、«循脉冲伏安溶出法»(CPVS)和位法(CP)在池中有机添加行定。此已的瑞士万通技与恒位/恒位以及外接的活 viva 件用,展了新的前景。有的校准器的恒位在每次量之前均自冲洗行校准,保精度。借助可更的量,可在使用不同的各用之快速切。

使用 viva 件行控制、数据采集和估。

884 Professional VA 供少了附件,没有量和。和 viva 可独。



SPE Professional VA

厚膜(*网印刷*,SPE)或 scTRACE Gold 行所需的量。

VA Professional-VA- SPE

使用厚膜(*网印刷*,SPE)所需的附件配。可厚膜的杆、拌器和量杯。无。

946 Portable VA Analyzer (SPE)

用于定重金属的便携式金属分析器。厚膜(*网印刷* ,SPE)的器版本。系由恒位和集成了拌器与可更式的独立量台成。用 Portable VA Analyzer 件。源由 USB 接口和内置的可充池提供。器装在手提箱内交付,包含了所有必需的附件。厚膜不在准配置范内。

CAg/AgCl

网印刷(助:C;参比:Ag/AgCl)