



Application Note AN-V-231

饮用水镉铅重金属丝网印刷电极快检系统

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.

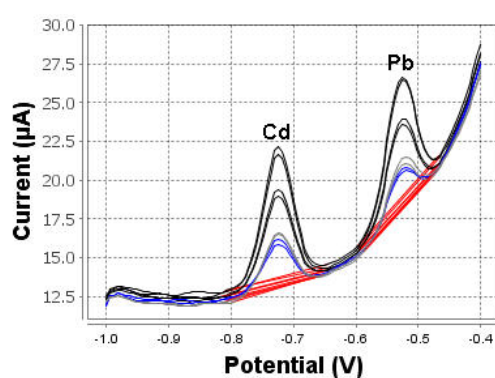
**Figure 3.** Determination in mineral water spiked with 2 µg/L cadmium and lead

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

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CONFIGURATION

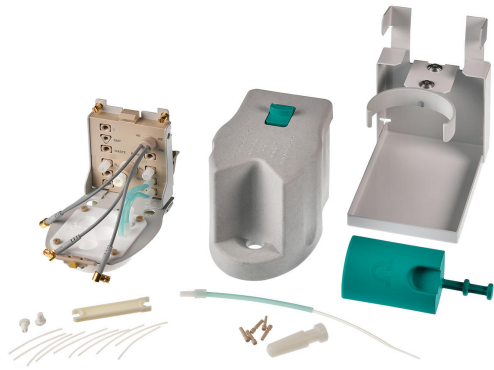


884 Professional VA

884 Professional VA 是 Professional VA/CVS 仪器系列的通用入门级设备。与合适的测量头和电极组联用,可使用伏安测量和极谱法借助多模式电极 pro、scTRACE Gold、铋液滴电极进行痕量分析测定,或通过《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)在电镀池中对有机添加剂进行测定。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,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,确保精度。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。

884 Professional VA 供货时减少了附件,没有测量头和电极。电极组和 **viva** 许可证则须单独订购。



SPE Professional VA

带厚膜电极(丝网印刷电极,SPE)或 scTRACE Gold 运行所需的测量头。



VA Professional-VA- SPE

使用厚膜电极(丝网印刷电极,SPE)所需的附件配备。可购买厚膜电极的电极杆、搅拌器和量杯。无电极。



946 Portable VA Analyzer (SPE)

用于测定重金属的便携式金属分析器。厚膜电极(丝网印刷电极,SPE)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。仪器装在手提箱内交付,包含了所有必需的附件。厚膜电极不在标准配置范围内。