



Application Note AN-V-225

Cadmium and lead in drinking water

Simultaneous determination on a mercury film modified glassy carbon electrode

To reduce the toxic effects of cadmium on the kidneys, skeleton, and the respiratory system, as well as the neurotoxic effects of lead, the provisional guideline values in the World Health Organization's (WHO) «Guidelines for Drinking-water Quality» are set to a maximum concentration of 3 µg/L for cadmium and 10 µg/L for lead.

The powerful anodic stripping voltammetry (ASV) technique on the ex-situ mercury film modified glassy carbon electrode is more than sufficient to monitor the proposed WHO guidelines for Cd and Pb in drinking water. The

main advantage lies in the ultrahigh sensitivity of this method. With a deposition time of 30 s, a limit of detection for β (Cd) = 0.02 µg/L and β (Pb) = 0.05 µg/L can be reached. The linear range for both elements goes up to approximately 50 µg/L using the same deposition time. The ability to re-plate the mercury film allows a quick and easy regeneration of the sensor. This method is best suited for both manual and automated systems, allowing the determination in a sample series comprised of a low to medium number of samples.

SAMPLE

Drinking water, mineral water, sea water

EXPERIMENTAL

Prior to the first determination, the ex-situ mercury film is deposited on the freshly polished glassy carbon electrode. In the next step, the electrodes are cleaned with ultrapure water and the measuring vessel is emptied. Then 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 using the parameters specified in **Table 1**. The concentration of both elements is determined by two additions of a cadmium, lead standard addition solution.



Figure 1. 884 Professional VA, fully automated for VA analysis

Table 1. Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Deposition potential	-1.0 V
Deposition time	90 s
Start potential	-0.85 V
End potential	-0.25 V
Peak potential Cd	-0.65 V
Peak potential Pb	-0.48 V

ELECTRODES

- Working electrode: Glassy carbon (GC-RDE)
- Reference electrode: Ag/AgCl/KCl (3 mol/L)
- Auxiliary electrode: Glassy carbon rod

RESULTS

The method is suitable for the determination of cadmium and lead in concentrations up to 25 $\mu\text{g/L}$. The limit of detection for 30 s deposition

time is approximately 0.02 $\mu\text{g/L}$ for cadmium and 0.05 $\mu\text{g/L}$ for lead.

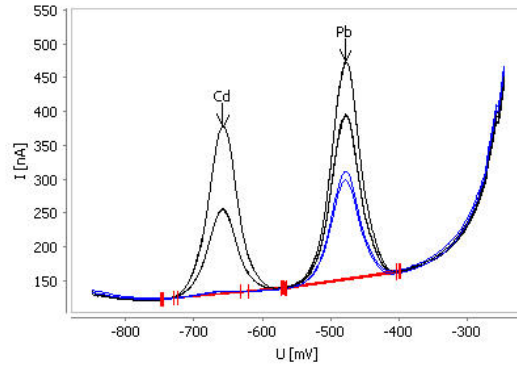


Figure 2. Determination of cadmium and lead in tap water

Table 2. Result

Sample	Cd ($\mu\text{g/L}$)	Pb ($\mu\text{g/L}$)
Tap water	0.02	1.76

REFERENCES

Application Bulletin 241: [Determination of cadmium and lead by anodic stripping voltammetry at a mercury film electrode](#)

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CONFIGURATION



CVS 884 Professional VA manual

用于 CVS 用的 884 Professional VA manual 是借助 «循环伏安溶出法»(CVS)、«循环脉冲伏安溶出法»(CPVS)和位法(CP)在池中有有机添加行高端定或采用旋行伏安法重金属定的入器。此已的瑞士万通技与高效位/恒位以及外接的活 **viva** 件用,展了新的 CVS 前景。有的校准器的恒位在每次量之前均自冲洗行校准,保可能的最高精度。集成的温度量入端可在量程中控溶液温度。

通此器也可以行伏安法定。借助可更的量,可在使用的各用之快速切。

使用 **viva** 件行控制、数据采集和估。

用于 CVS(伏安量)用的 884 Professional VA manual 供有大量附件,以及用于旋的量。和 **viva** 可独。



VA Glassy Carbon RDE Professional VA

整套,用于伏安定,例如采用汞膜技。包含旋、玻、参比、玻助、量杯和解溶液。