



Application Note AN-V-227

使用玻璃碳电极检测饮用水中的六价铬(Cr^{6+})

Ultra-sensitive determination on the mercury film modified glassy carbon electrode (DTPA method)

The guideline value for chromium in the World Health Organization's (WHO) «Guidelines for Drinking-water Quality» is $50 \mu\text{g/L}$. It should be noted here that chromium concentrations are often expressed as total chromium and not as chromium(III) or (VI). Chromium(VI) is responsible for changes in genetic material, and is found in significantly lower concentrations than Cr(III). Therefore an extremely sensitive method is required to monitor Cr(VI) in drinking water.

The powerful adsorptive stripping voltammetry

(AdSV) technique on the ex-situ mercury film modified glassy carbon electrode using DTPA as complexing agent can be used to determine such low concentrations. With a deposition time of 90 s, the limit of detection of $0.05 \mu\text{g/L}$ Cr(VI) can be reached. The ability to re-plate the mercury film allows a quick and easy regeneration of the sensor. This approach is best suited for both manual and automated systems, allowing determination in a sample series with 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 a 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 with complexing agent

(diethylenetriaminepentaacetic acid, DTPA) are pipetted into the measuring vessel. The determination of chromium(VI) is carried out with the 884 Professional VA using the parameters specified in **Table 1**. The concentration is determined by two additions of a chromium(VI) 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	-1.0 V
End potential	-1.5 V
Peak potential Cr(VI)	-1.28 V

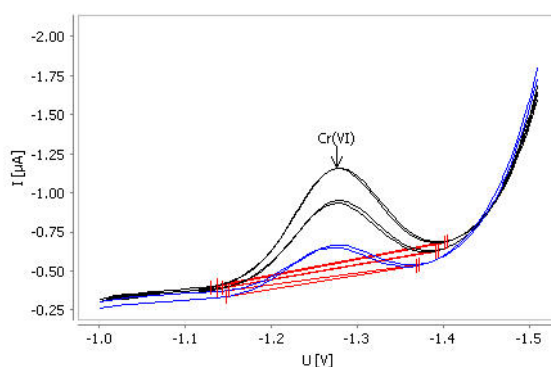
ELECTRODES

- 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 chromium(VI) concentrations up to 1 µg/L. The

limit of detection for 90 s deposition time is approximately 0.05 µg/L.

**Figure 2.** Determination of chromium(VI) in tap water spiked with 0.25 µg/L**Table 2.** Result

Sample	Cr(VI) (µg/L)
Tap water spiked with 0.25 µg/L Cr(VI)	0.28

CONTACT

Metrohm Taiwan Ltd.
開封街二段 46 號 5 樓
108 台北市

info@metrohm.com.tw

CONFIGURATION



CVS 884 Professional VA manual

用于 CVS 应用的 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)和计时电位法(CP)在电镀池中对有机添加剂进行测定或采用旋转圆盘电极进行伏安法重金属测定的入门仪器。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,展现了新的 CVS 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。集成的温度测量输入端可在测量过程中监控溶液温度。

通过此仪器也可以进行伏安法测定。借助可更换的测量头,可在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 CVS(伏安测量)应用的 884 Professional VA manual 供货时带有大量附件,以及用于旋转圆盘电极的测量头。电极组和 **viva** 许可证则须单独订购。

VA Glassy Carbon RDE Professional VA

整套电极组,用于伏安测定,例如采用汞膜电极技术。包含旋转圆盘电极驱动、玻碳电极头、参比电极、玻碳辅助电极、量杯和电解质溶液。

