Application Note AN-V-227

Chromium(VI) in drinking water

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 µg/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 µg/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.

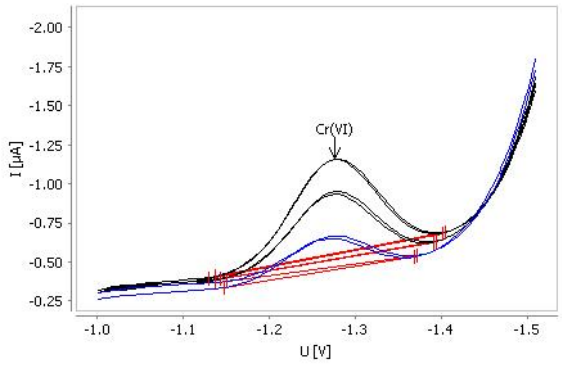

Figure 2. Determination of chromium(VI) in tap water spiked with 0.25 µg/L

Table 2. Result

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

CONTACT

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CONFIGURATION

CVS 884 Professional VA manual

用于 CVS 用的 884 Professional VA manual 是借助 «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,可在使用不同的各用之快速切。

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 CarbonRDE 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。