



Application Note AN-V-227

## 使用玻璃用水中的六价( $\text{Cr}^{6+}$ )

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 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 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

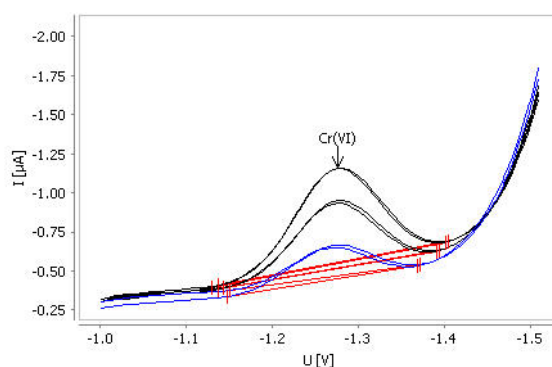
## ELECTRODES

- 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 g/L. The limit of

detection for 90 s deposition time is approximately 0.05 g/L.

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

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

RESULTS

Internal reference: AW VA CH4-0595-042020

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CONFIGURATION



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