



Application Note AN-V-230

# Chromium(VI) in drinking water

## Sensitive determination on the mercury film modified scTRACE Gold (DTPA method)

The guideline value for total chromium in the World Health Organization's (WHO) «Guidelines for Drinking-water Quality» is 50  $\mu\text{g/L}$ . Chromium(VI) is more toxic than its trivalent form (Cr(III)) and is also less abundant. Therefore a robust and sensitive method is required to monitor its concentration in drinking water.

The mercury film modified scTRACE Gold can be used to monitor chromium(VI), offering easy handling and a high grade of stability. The sensor itself contains all necessary electrodes: the gold micro-wire working electrode, Ag/AgCl

reference, and the carbon auxiliary electrode integrated on a ceramic substrate which does not need intensive maintenance like polishing. Adsorptive stripping voltammetry (AdSV) using diethylenetriaminepentaacetic acid (DTPA) as a complexing agent and catalytic signal enhancement allows chromium(VI) detection at very low levels, with a limit of detection of 2  $\mu\text{g/L}$ . The ability to replate the mercury film allows a quick and easy regeneration of the sensor. This method is best suited for field applications.

## SAMPLE

Drinking water, mineral water, sea water

## EXPERIMENTAL

Prior to the first determination, the ex-situ mercury film is deposited on the scTRACE Gold electrode. In the next step, the electrodes are cleaned with ultrapure water and the measuring vessel is emptied. The water sample, the supporting electrolyte with the complexing agent (DTPA) are pipetted into the measuring vessel. The determination of chromium(VI) is carried out with a 946 Portable VA Analyzer using the parameters specified in **Table 1**. The concentration is determined by two additions of a chromium(VI) standard addition solution. The scTRACE Gold is electrochemically activated prior to the first determination.



**Figure 1.** 946 Portable VA Analyzer

**Table 1.** Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Start potential	-1.15 V
End potential	-1.65 V
Peak potential Cr(VI)	-1.4 V

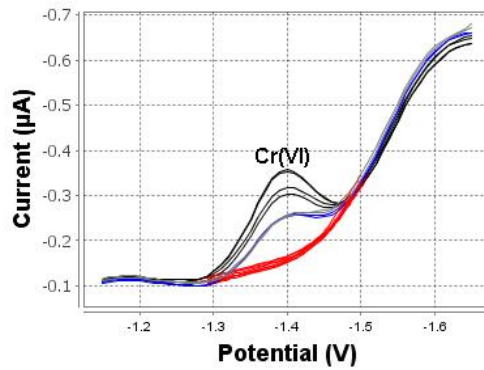
## ELECTRODES

- scTRACE Gold

## RESULTS

The method is suitable for the determination of chromium(VI) concentrations up to 40  $\mu\text{g/L}$ .

The limit of detection without deposition time is approximately 5  $\mu\text{g/L}$ .



**Figure 2.** Determination of chromium(VI) in tap water spiked with 30 µg/L

**Table 2.** Result

Sample	Cr(VI) (µg/L)
Tap water spiked with 30 µg/L Cr(VI)	32.1

Internal reference: AW VA CH4-0596-042020

## CONTACT

瑞士万通中国  
 北京市海淀区上地路1号院  
 1号楼7702  
 100085 北京

marketing@metrohm.com.cn

## CONFIGURATION



### 946 Portable VA Analyzer (scTRACE Gold)

用于定重金属,如痕量汞、砷、或之重金属的便携式金属分析器。scTRACE Gold 用的器版本。系由恒位和集成了拌器与可更式的独立量台成。用 Portable VA Analyzer 件。源由 USB 接口和内置的可充池提供。装在手提箱内交付,包含所有必需的附件。