



Application Note AN-V-217

Nickel, cobalt in drinking water

Straightforward determination by voltammetry using a gold microwire electrode

Nickel is widely used in stainless steel production. At high enough concentrations, it is known to cause allergic reactions when in contact with skin. Drinking water may be contaminated by taps which are made from metals containing nickel. The guideline value for nickel in the World Health Organization's «Guidelines for Drinking-water Quality» is set to 70 µg/L. National limit values of typically lower at e. g. 20 µg/L. Cobalt usually occurs associated with nickel and can be found in smaller concentrations besides nickel.

Adsorptive stripping voltammetry is a viable, less sophisticated alternative to atomic absorption spectroscopy (AAS) for the determination of nickel and cobalt in drinking water. While AAS (and competing methods) can only be performed in a laboratory, adsorptive stripping voltammetric determinations can be used in the laboratory or alternatively in the field with the 946 Portable VA Analyzer. The determination is carried out on a bismuth film applied to the scTRACE Gold electrode.

SAMPLE

Tap water

EXPERIMENTAL

The scTRACE Gold is electrochemically activated prior to the first determination. In the next step, the water sample and the supporting electrolyte are pipetted into the measuring vessel. The determination is carried out with the 884 Professional VA or with the 946 Portable VA Analyzer using the parameters specified in **Table 1**. The concentration is determined by two additions of a standard addition solution.



Figure 1. 946 Portable VA Analyzer (scTRACE Gold version)



Figure 2. 884 Professional VA fully automated for VA

Table 1. Parameters

Parameter	Setting
Mode	SQW – Square wave
Deposition potential	-0.8 V
Deposition time	30 s
Start potential	-0.8 V
End potential	-1.4 V
Peak potential Ni	-1.1 V
Peak potential Co	-1.25 V

ELECTRODES

- scTRACE Gold

RESULTS

The limit of detection of the method for both elements is approximately 1 µg/L with the 946

Portable VA Analyzer, and about 0.2 µg/L with the 884 Professional VA.

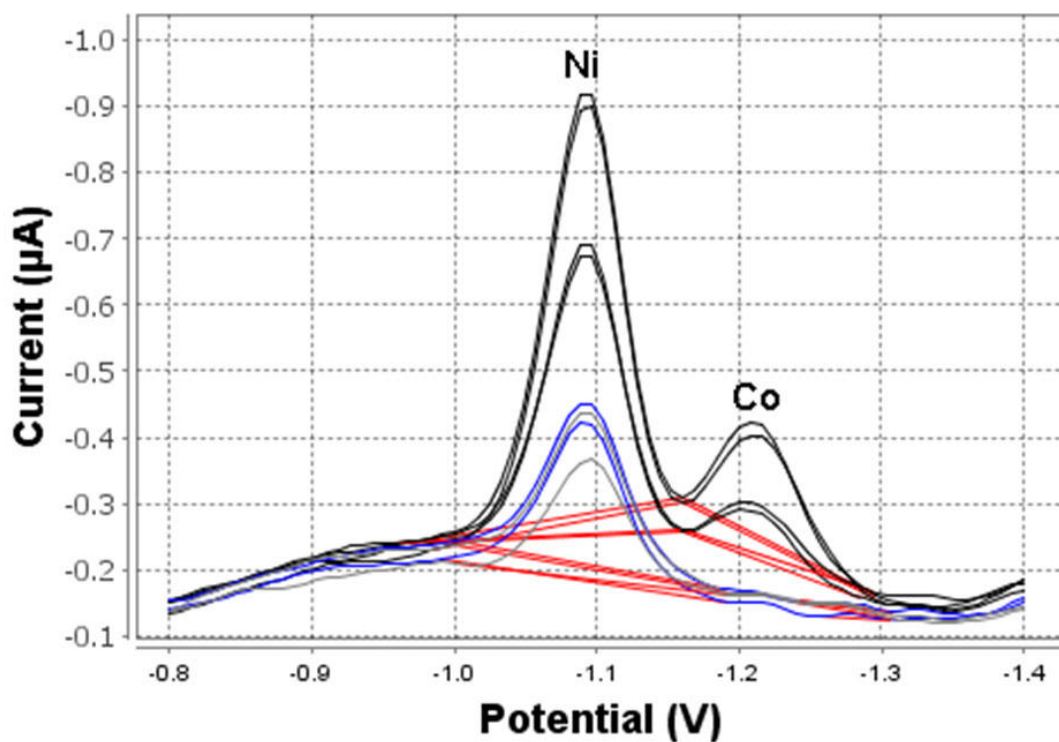


Figure 3. Determination of nickel, cobalt (946 Portable VA Analyzer; 30 s deposition time)

Table 2. Results of nickel and cobalt determination in tap water

Sample	Ni (($\mu\text{g/L}$))	Co ($\mu\text{g/L}$)
Tap water	1.3	<1

Internal references: AW VA CH4-0571-092018;

AW VA CH4-0572-092018

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CONFIGURATION



(MME) 884 Professional VA manual

用于多模式电极 (MME) 的 884 Professional VA manual 是借助多模式电极 pro 或 scTRACE Gold 或铋液滴电极使用伏安法和极谱法进行痕量分析的入门仪器。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,在重金属测定领域中展现了新的前景。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,确保可能的高精度。

通过此仪器也可使用旋转圆盘电极进行测定,例如借助«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)测定电镀池中的有机添加剂。借助可更换的测量头,可在使用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 MME(多模式电极)的 884 Professional VA manual 供货时配备大量附件,包括用于多模式电极 pro 的测量头。电极组和 **viva** 许可证则须单独订购。



VA scTRACE Gold Professional VA

整套电极组,用于测定砷或汞。包括用于 scTRACE Gold、scTRACE Gold、搅拌器和量杯的支架。



946 Portable VA Analyzer (scTRACE Gold)

用于测定重金属,如痕量砷,汞,铜,铅,锌,镍,钴,铁、铋或铈之类重金属的便携式金属分析器。scTRACE Gold 适用的仪器版本。该系统由恒电位仪和集成了搅拌器与可更换式电极的独立测量台构成。该设备用 Portable VA Analyzer 软件驱动。电源由 USB 接口和内置的可充电电池提供。设备装在手提箱内交付,包含所有必需的附件。