



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 are 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.

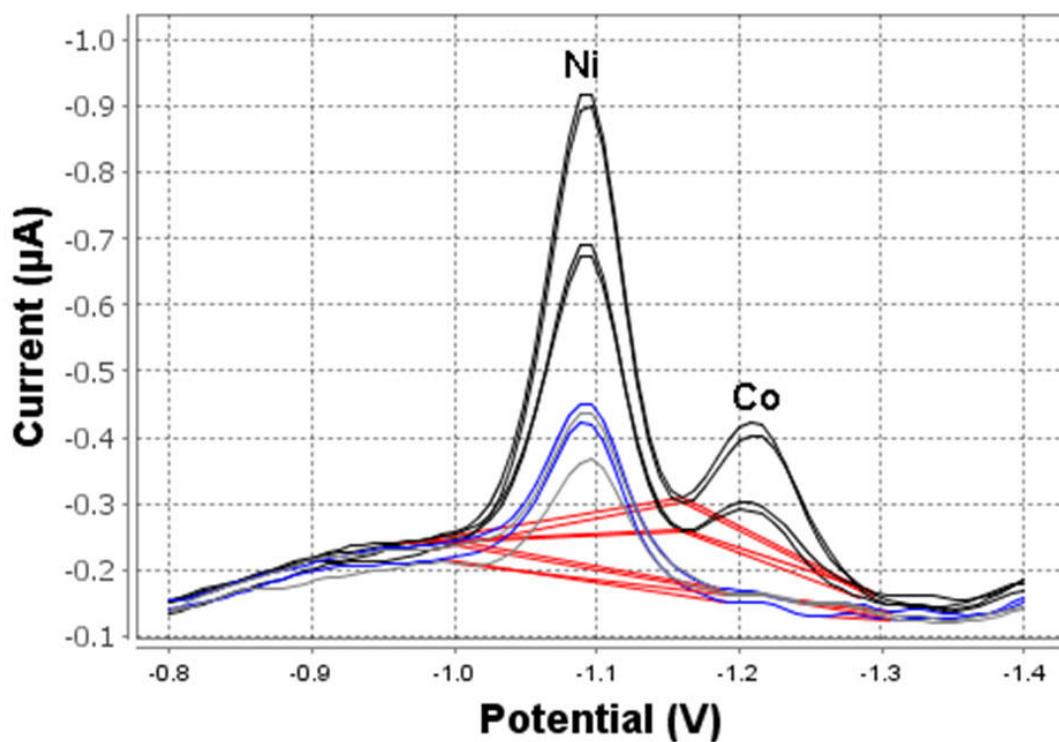


Figure 3. Determination of nickel, cobalt (946 Portable VA Analyzer; 30 s deposition time)

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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