



Application Note AN-V-223

# Nickel and cobalt in drinking water

## Simultaneous determination in the ng/L range on the Bi drop electrode

The main sources of nickel pollution are electroplating, metallurgical operations, or leaching from pipes and fittings. Catalysts for the petroleum and chemical industries are major application fields for cobalt. In both cases, the metal is either released directly, or via the waste water-river pathway into the drinking water system. Therefore in the EU the legislation specifies 20  $\mu\text{g/L}$  as the limit value for the Ni concentration in drinking water.

The simultaneous and straightforward determination of nickel and cobalt is based on

adsorptive stripping voltammetry (AdSV). The unique properties of the non-toxic Bi drop electrode combined with AdSV results in an excellent performance in terms of sensitivity. The limit of detection for 30 s deposition time is approximately 0.2  $\mu\text{g/L}$  for nickel and 0.1  $\mu\text{g/L}$  for cobalt, and can be lowered further by increasing the deposition time. This method is best suited for automated systems or process analyzers, allowing fully automatic determination in large sample series.

## SAMPLE

Drinking water, mineral water, sea water

## EXPERIMENTAL

The water sample is pipetted into the measuring vessel. Ammonia / ammonium chloride buffer and the complexing agent dimethylglyoxime (DMG) are added, and the simultaneous determination of nickel and cobalt is carried out with a 884 Professional VA using the parameters

specified in **Table 1**. The concentration is determined by two additions of a nickel and cobalt standard addition solution.

The Bi drop electrode is electrochemically activated prior to the first determination.



**Figure 1.** 884 Professional VA fully automated for VA analysis

**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	-1.3 V
Peak potential Ni	-0.97 V
Peak potential Co	-1.12 V

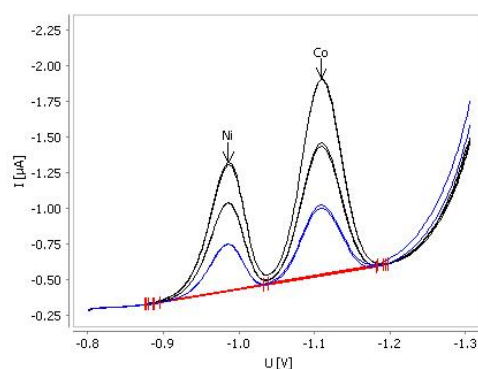
## ELECTRODES

- Working electrode: Bi drop
- Reference electrode: Ag/AgCl/KCl (3 mol/L)
- Auxiliary electrode: Glassy carbon rod

## RESULTS

The method is suitable for the determination of nickel and cobalt concentrations in water

samples from  $\beta(\text{Ni}^{2+}) = 0.2\text{--}8 \mu\text{g/L}$  and  $\beta(\text{Co}^{2+}) = 0.1\text{--}10 \mu\text{g/L}$ .



**Figure 2.** Determination of nickel and cobalt in tap water spiked with  $\beta(\text{Ni}) = 0.5 \mu\text{g/L}$  and  $\beta(\text{Co}) = 0.5 \mu\text{g/L}$

**Table 2.** Result

Sample	Ni ( $\mu\text{g/L}$ )	Co ( $\mu\text{g/L}$ )
Tap water spiked with $\beta$ (Ni) = 0.5 $\mu\text{g/L}$ and $\beta$ (Co) = 0.5 $\mu\text{g/L}$	0.58	0.54

## REFERENCES

Application Bulletin 440: Determination of nickel and cobalt in water samples by adsorptive stripping voltammetry with a Bi drop electrode

## CONTACT

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## CONFIGURATION



### (MME) 884 Professional VA manual

用于多模式 (MME) 的 884 Professional VA manual 是借助多模式 pro 或 scTRACE Gold 或液滴使用伏安法和法行高端痕量分析的入器。此已的瑞士万通技与高效位/恒位以及外接的活 viva 件用,在重金属定域中展了新的前景。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。

通此器也可使用旋行定,例如借助«循伏安溶出法»(CVS)、«循脉冲伏安溶出法»(CPVS)和位法(CP)定池中的有机添加。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 MME(多模式)的 884 Professional VA manual 供配大量附件,包括用于多模式 pro 的量。和 viva 可独。



## VA Professional VA

完整的套件,用于伏安法定重金属。包含滴、参比、玻璃助、量杯、拌器,解液和其他附件。