



Application Note AN-V-223

饮用水镍钴双金属铋滴电极检测系统

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

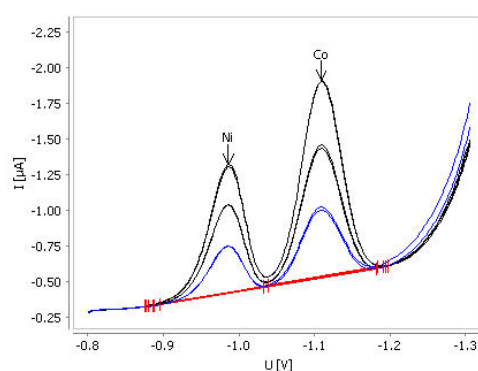


Figure 2. Determination of nickel and cobalt in tap water spiked with $\beta(\text{Ni}) = 0.5\text{ }\mu\text{g/L}$ and $\beta(\text{Co}) = 0.5\text{ }\mu\text{g/L}$

Table 2. Result

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

Metrohm Taiwan Ltd.
開封街二段 46 號 5 樓
108 台北市

info@metrohm.com.tw

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 Professional VA

完整的电极套件,用于伏安法测定重金属。包含铋滴电极、参比电极、玻璃碳辅助电极、量杯、搅拌器,电解液和其他附件。