



Application Note AN-V-218

Bismuth in drinking water

Straightforward determination by voltammetry using a gold microwire electrode

Bismuth is considered as a metal with a very low toxicity. However, in high concentrations toxic effects have been described. There is no guideline value for bismuth in the World Health Organization's «Guidelines for Drinking-water Quality» because typical levels usually found in drinking water are of no concern.

Anodic stripping voltammetry is a viable, less

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

SAMPLE

Bottled mineral 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 | DP – Differential Pulse |
| Deposition potential | -0.1 V |
| Deposition time | 30 s |
| Start potential | -0.2 V |
| End potential | 0.3 V |
| Peak potential Bi | 0.08 V |

ELECTRODES

- scTRACE Gold

RESULTS

The limit of detection of the method is about 1 µg/L with the 946 Portable VA Analyzer, and approximately

0.03 µg/L with the 884 Professional VA.

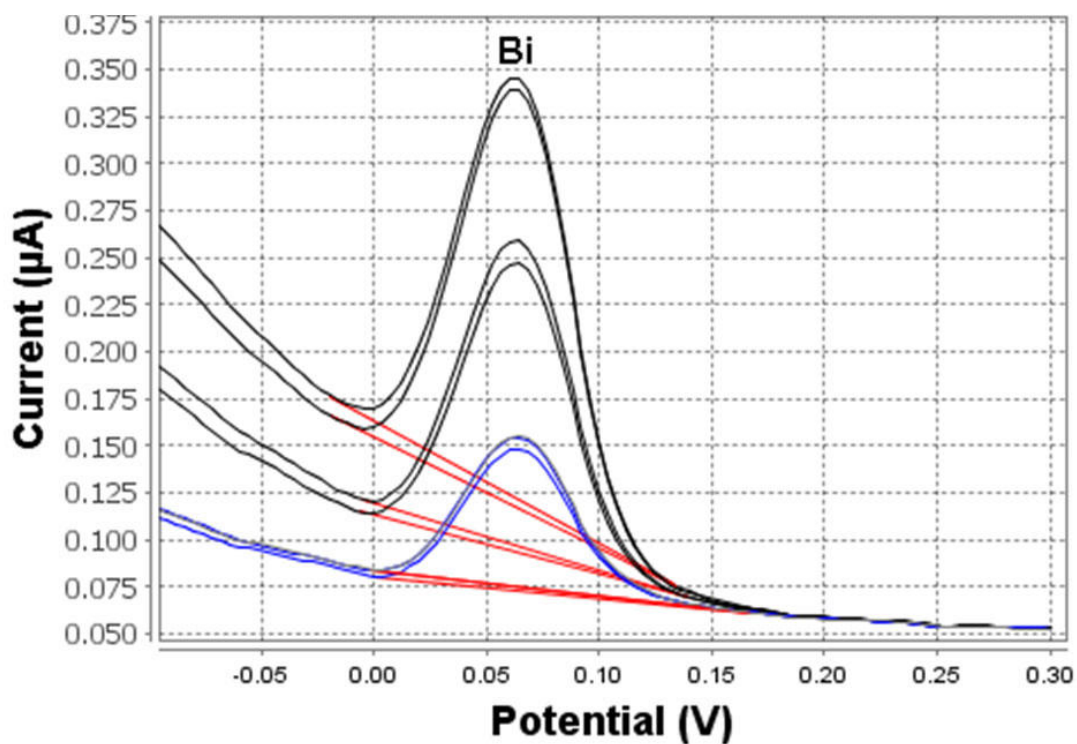


Figure 3. Determination of bismuth (946 Portable VA Analyzer; 30 s deposition time)

Table 2. Results of the measurement of Bi in tap water

| Sample | Bi ($\mu\text{g/L}$) |
|-----------|------------------------|
| Tap water | 20.4 |

Internal references: AW VA CH4-0568-042018, AW

VA CH4-0577-022019

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