Application Note AN-V-211

Arsenic(III) in mineral water

Sensitive and selective determination by voltammetry using a gold microwire electrode

Arsenic is ubiquitous in the earth's crust in low concentrations. Elevated levels can be found in mineral deposits and ores. Arsenic from such deposits leaches into the groundwater in the form of arsenite (AsO_3^{3-}) and arsenate (AsO_4^{3-}), causing its contamination. As(III) is more toxic than As(V) and shows higher mobility in the environment. The selective determination of this species is possible using the method described in this document.

With a limit of detection (LOD) of 0.3 µg/L, anodic stripping voltammetry allows speciation, i.e. the specific determination of As(III). While atomic absorption spectroscopy (AAS) (and competing methods) can only determine the total element concentration, anodic stripping voltammetry is selective to the As(III) oxidation state. 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 of arsenic 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 an arsenic standard addition solution.

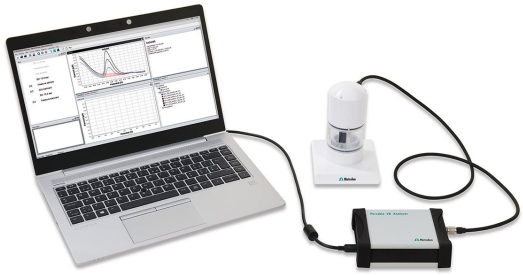

Figure 1. 946 Portable VA Analyzer (scTRACE Gold version)

Figure 2. 884 Professional VA fully automated for VA

Table 1. Parameters

Parameter	Setting
Mode	SQW – Square wave
Deposition potential	-0.5 V
Deposition time	60 s
Start potential	-0.3 V
End potential	0.4 V
Peak potential As	0V

ELECTRODES

- scTRACE Gold

RESULTS

With a 60 s deposition time, this method is suitable for the determination of arsenic in water samples in concentrations from β(As(III)) = 0.3–10 µg/L.

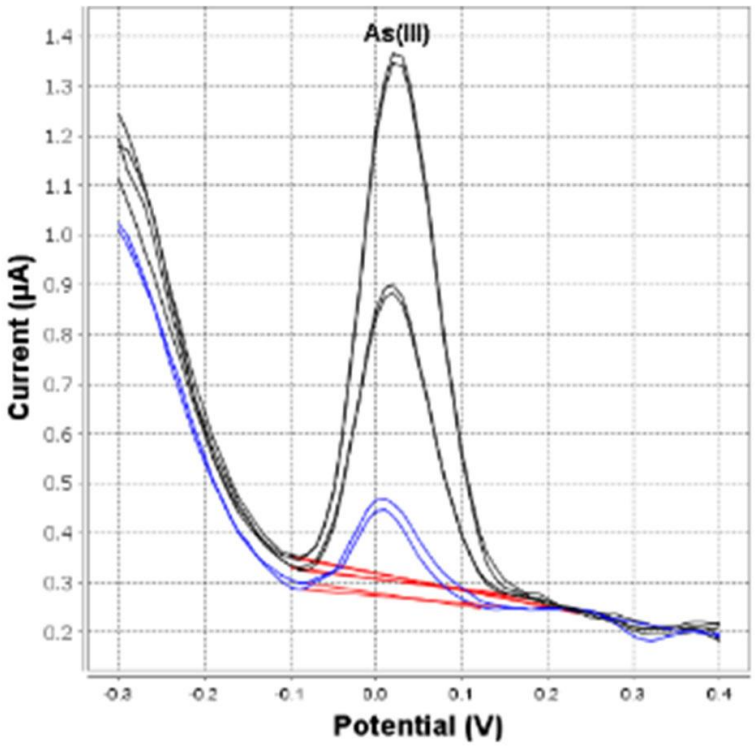

Figure 3. Determination of arsenic in bottled mineral water (946 Portable VA Analyzer; 60 s deposition time)

Table 2. Results of the determination of As(III) in mineral water

Sample	As (µg/L)
Bottled mineral water	1.4

REFERENCES

Application Bulletin 416: Determination of arsenic in water with the scTRACE Gold

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