Application Note AN-V-216

Iron in drinking water

Straightforward determination by voltammetry using a gold microwire electrode (DHN method)

Iron is an essential element in human nutrition. It can be present in drinking water as a result of water treatment or from corrosion in the water piping system. There is no guideline value for iron in the World Health Organization's «Guidelines for Drinking-water Quality» because typical levels usually found in drinking water are of no concern. However, there are national limit values in various countries. The European Union has set a guideline indicator value for iron of 200 µg/L.

Voltammetry is a viable, less sophisticated alternative to atomic absorption spectroscopy (AAS) for the determination of iron in drinking water. While AAS (and competing methods) can only be performed in a laboratory, adsorptive stripping voltammetric determinations can be done used conventionally in the laboratory or alternatively in the field using the with 946 Portable VA Analyzer. The determination is carried out with adsorptive stripping voltammetry (AdSV) using 2,3-dihydroxynaphthalene (DHN) on 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.

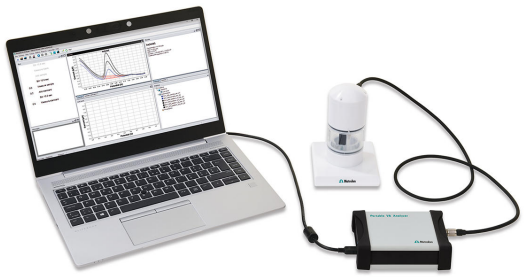

Figure 1. 946 Portable VA Analyzer (scTRACE Gold version)

Figure 2. 884 Professional VA fully automated for VA

Table 1. Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Deposition potential	0 V
Deposition time	30 s
Start potential	-0.3 V
End potential	-0.95 V
Peak potential Fe	-0.65 V

ELECTRODES

- scTRACE Gold

RESULTS

The limit of detection of the method is about 10 µg/L with the 946 Portable VA Analyzer, and approximately 0.3 µg/L with the 884 Professional VA.

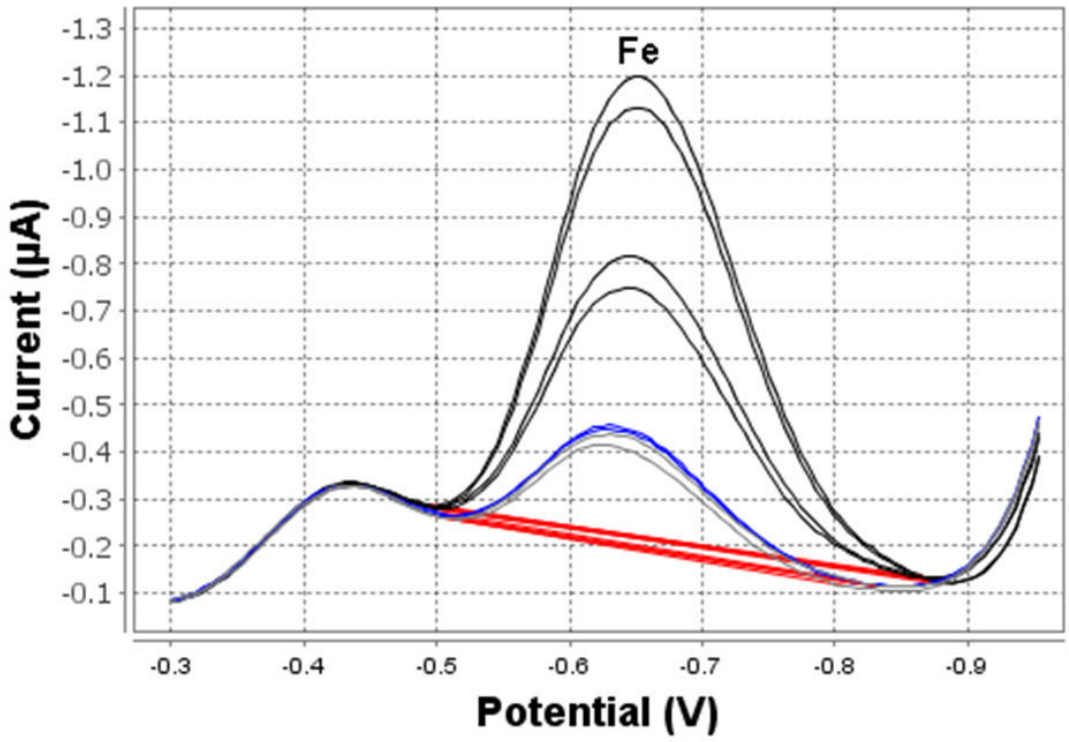

Figure 3. Determination of iron in tap water (946 Portable VA Analyzer; 30 s deposition time)

Table 2. Results for the measurement of Fe in spiked tap water

Sample	Fe, blank subtracted (µg/L)
Tap water (spiked)	10

Internal references: AW VA CH4-0578-032019; AW VA CH4-0582-042019

CONTACT

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CONFIGURATION

884 Professional VA manual for Multi-Mode Electrode (MME)

884 Professional VA manual for Multi-Mode Electrode (MME) is the entry-level instrument for high-end trace analysis with voltammetry and polarography with the Multi-Mode Electrode pro or the scTRACE Gold or the Bismuth drop electrode. The proven Metrohm electrode methods in combination with a high-performance potentiostat/galvanostat and the extremely flexible viva software open up new perspectives for the determination of heavy metals. The potentiostat with a certified calibrator readjusts itself automatically before each measurement, thus guaranteeing maximum precision.

Determinations with rotating disc electrodes can also be performed with the instrument, e.g. determinations of organic additives in electroplating baths with "Cyclic Voltammetric Stripping" (CVS), "Cyclic Pulse Voltammetric Stripping" (CPVS), and chronopotentiometry (CP). The replaceable measuring head enables rapid changes between the various applications with different electrodes.

The viva software is required for control, data collection, and evaluation.

The 884 Professional VA manual for MME is supplied with extensive accessories and a measuring head for the Multi-Mode Electrode pro. Electrode set and viva license need to be ordered separately.

VA electrode equipment with scTRACE Gold for Professional VA instruments

Complete electrode set for the determination of arsenic or mercury. Includes holders for scTRACE Gold, scTRACE Gold, stirrer and measuring vessel.

946 Portable VA Analyzer (scTRACE Gold)

Portable metal analyzer for the determination of heavy metals such as arsenic, mercury, copper, lead, zinc, nickel, cobalt, iron, bismuth or antimony in the trace range. Instrument version for the scTRACE Gold. The system is comprised of potentiostat and separate measuring stand with integrated stirrer and replaceable electrode. The instrument is operated with the Portable VA Analyzer software. The power is supplied via the USB connector and via the integrated rechargeable battery. The instrument is supplied with all required accessories in a carrying case.