

VA Application Note 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, anodic 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.

Method description

Sample

- Tap water

Instrument

946 Portable VA Analyzer (scTRACE Gold version)



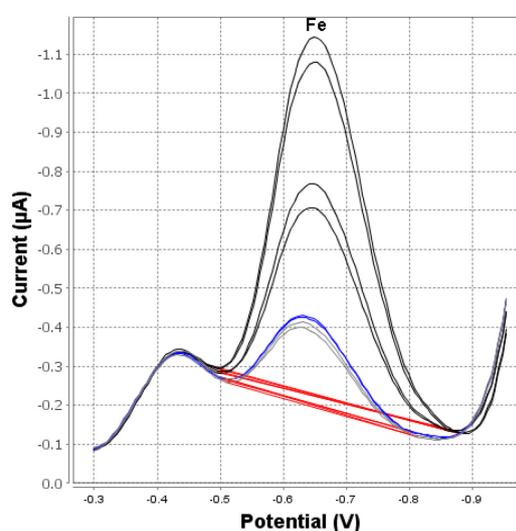
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Parameters

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

Example



Electrodes

scTRACE Gold	6.1258.000
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Solutions

Supporting electrolyte	Ammonium chloride / ammonia buffer
Auxiliary solution	KBrO ₃
Complexing agent	2,3-Dihydroxynaphthalene in methanol/water
Fe standard addition solution	$\beta(\text{Fe}^{3+}) = 1 \dots 10 \text{ mg/L}$

Analysis

15 mL sample, 0.15 mL complexing agent, 3 mL KBrO₃ solution and 1.5 mL supporting electrolyte are added into the measuring vessel. The concentration is determined with two standard additions.

Results

Sample	Concentration, blank subtracted [µg/L]
Tap water (spiked)	10

Comments

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