Iron determination in drinking water

Wide linear range with a low detection limit using the Bi drop electrode and the triethanolamine method

The presence of iron in drinking water can lead to an unpleasant, harsh metallic taste or reddish-brown stains. In addition, «iron bacteria» which can grow in waters containing Fe as low as 0.1 mg/L, create a reddish-brown slime that can clog plumbing and cause an offensive odor. Over a longer period, the formation of insoluble iron deposits is problematic in many industrial

and agricultural applications, such as water supply, system cooling, or field irrigation. To avoid these problems, the U.S. Environmental Protection Agency (EPA) defines the Secondary Maximum Contaminant Level (SMCL) for water treatment and processing plants as 0.3 mg/L Fe in drinking water.

The voltammetric determination of the iron

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triethanolamine complex on the non-toxic Bi drop electrode does not require enrichment. This system uses catalytic signal enhancement, allowing both the detection at very low levels (limit of detection of 0.005 mg/L) and measurements in a wide range of concentrations up to 0.5 mg/L. This method is best suited for automated systems or process analyzers, allowing fully automatic determination of iron in a large sample series.

SAMPLE

Drinking water, mineral water, sea water

EXPERIMENTAL

The water sample and the supporting electrolyte are pipetted into the measuring vessel. The determination of iron is carried out with a 884 Professional VA using the parameters specified in Table 1. The concentration is determined by two additions of an iron standard addition solution.

The Bi drop electrode is electrochemically activated prior to the first determination.

Figure 1. 884 Professional VA fully automated for VA

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Table 1. Parameters

| Parameter	Setting
Mode	DP – Differential Pulse
Start potential	-0.75 V
End potential	-1.25 V
Peak potential Fe	-1 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 iron in water samples in concentrations from β (Fe) = 10–500 µg/L. The limit of detection of the method is approximately β (Fe) = 5 µg/L.
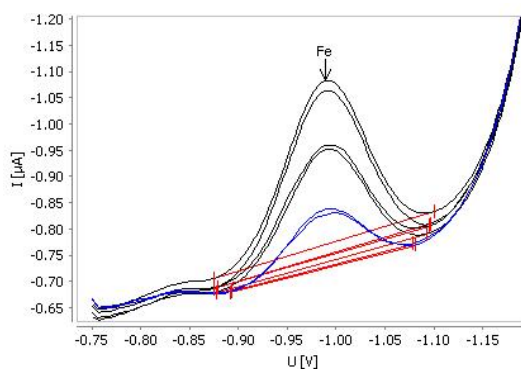
Figure 2. Determination of iron in tap water spiked with β (Fe) = 20 µg/L

Table 2. Result

Sample	Fe (µg/L)
Tap water spiked with β (Fe) = 20 µg/L	19.1

REFERENCES

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CONFIGURATION

 (MME) 884 Professional VA manual

用于多模式（MME）的 884 Professional VA manual 是借助多模式 pro 或 scTRACE Gold 或液滴使用伏安法和法行高端痕量分析的入器。此已的瑞士万通技与高效位/恒位以及外接的活 viva 件用,在重金属定域中展了新的前景。有的校准器的恒位在每次量之前均自冲洗行校准,保可能的最高精度。

通此器也可使用旋行定,例如借助«循伏安溶出法»(CVS)、«循脉冲伏安溶出法»(CPVS)和位法(CP)定池中的有机添加。借助可更的量,可在使用不同的各用之快速切。

使用 viva 件行控制、数据采集和估。

用于 MME(多模式)的 884 Professional VA manual 供配大量附件,包括用于多模式 pro 的量。和 viva 可独。

VA Professional VA

完整的套件,用于伏安法定重金属。包含滴、参比、玻璃助、量杯、拌器,解液和其他附件。

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