

Application Note AN-V-061

Iron speciation in water with the Multi-Mode Electrode pro

Simultaneous determination of Fe(II) and Fe(III) in mg/L concentration levels

Various industries depend on knowing the exact concentrations of different iron species in their water. Traditional analytical methods often have difficulty to accurately distinguish between Fe(II) and Fe(III) because they have similar chemical properties. This leads to errors and incorrect data, hindering advancements in critical fields like energy generation/storage and research into chemical or electrochemical processes.

Cathodic sweeping voltammetry (CSV) overcomes these challenges and offers a robust, cost-effective, and convenient alternative to other techniques. Its ability to distinguish between ferrous and ferric iron is unparalleled. This improved accuracy enables scientists to make significant steps in technological research and industrial efficiency. In this Application Note, the Multi-Mode Electrode pro is used to simultaneously determine Fe(II) and Fe(III) in water.

SAMPLE

Check standard solutions

EXPERIMENTAL

Add the water sample to a vessel filled with degassed electrolyte. Use two standard additions with separate Fe(II) and Fe(III) standard solutions to perform the quantification.



Figure 1. 884 Professional VA manual for MME.

Table 1. Parameters

Parameter	Setting
Mode	DME
Start potential	0.0 V
End potential	-1.5 V
Sweep rate	30 mV/s
Peak potential Fe(II)	-0.25 V
Peak potential Fe(III)	-0.8 V

ELECTRODES

- Multi-Mode Electrode pro

RESULTS

The voltammogram shown in **Figure 2** illustrates the successful determination of Fe(II) and Fe(III) species in a solution containing 0.5 mg/L of each. The clear resolution of the two peaks demonstrates the capability of the method to differentiate and quantify Fe(II) and Fe(III) in a mixed solution.

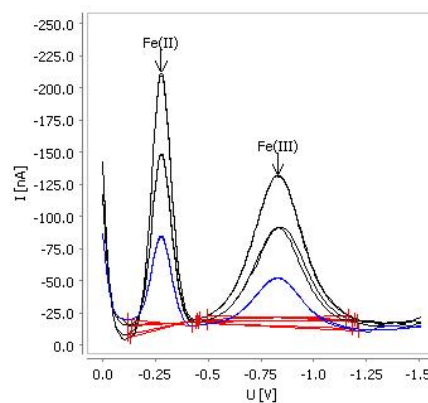


Figure 2. Results of iron speciation determination in a check standard solution by CSV.

Table 2. Result

Sample	Fe(II) (mg/L)	Fe(III) (mg/L)
Check standard solution	0.507	0.516

CONTACT

Metrohm Hispania
Calle Aguacate 15
28044 Madrid

mh@metrohm.es

CONFIGURATION



884 Professional VA manual para electrodo Multi-Mode (MME)

884 Professional VA manual para electrodo Multi-Mode (MME) es el aparato de iniciación para el análisis de trazas de última generación mediante voltamperometría y polarografía con el electrodo Multi-Mode pro, el scTRACE Gold o el electrodo a gota de bismuto. La reconocida tecnología de electrodos de Metrohm, combinada con un potente potenciostato/galvanostato y el software viva sumamente flexible, aporta nuevas perspectivas para la determinación de metales pesados. El potenciostato con calibrador certificado se reajusta automáticamente antes de cada medida y garantiza la mayor precisión posible.

Con el aparato también se pueden llevar a cabo determinaciones con electrodos de disco rotatorio, como determinaciones de aditivos orgánicos en banos galvánicos mediante la voltamperometría de redisolución cíclica (CVS), la voltamperometría de redisolución cíclica por impulsos (CPVS) y la cronopotenciometría (CP). El cabezal de medida intercambiable permite cambiar rápidamente entre las diversas aplicaciones con electrodos diferentes.

El software **viva** es necesario para el control, así como para el registro y evaluación de datos.

El 884 Professional VA manual para MME se suministra con una extensa gama de accesorios y un cabezal de medida para el electrodo Multi-Mode pro. El juego de electrodos y la licencia **viva** se deben pedir por separado.