



Application Note AN-V-195

Iodate in electroless nickel baths

Polarographic determination of iodate stabilizers

In the past, lead was commonly used as a stabilizer in electroless nickel plating processes. The regular and precise determination of the stabilizer concentration is essential to keep the plating process under stable conditions and to run the process successfully. As restrictions on the use of lead in consumer products (particularly electronics) have grown in recent years, alternative stabilizers were developed and introduced. One of the stabilizers used as a lead replacement is iodate (IO_3^-).

Electroless nickel plating is used in various industrial production processes (e.g., production of hard disks,

and for protection against corrosion or wear). The ENIG (electroless nickel, immersion gold) and ENEPIG (electroless nickel, electroless palladium, immersion gold) processes in the production of printed circuit boards (PCB) are very reliant on the success of this method as electroless nickel plating is the first step in the process.

Polarography can be used to determine the iodate content after dilution in supporting electrolyte and has been established as a straightforward, sensitive, selective, and interference-free method for this application.

SAMPLE

Electroless nickel plating bath

EXPERIMENTAL

After diluting the sample in electrolyte, the polarographic determination of iodate is carried out on the 884 Professional VA with the Multi-Mode Electrode pro as working electrode using the parameters listed in **Table 1**. The concentration of iodate is determined by two additions of standard addition solution.



Figure 1. 884 Professional VA.

Table 1. Parameters for the iodate determination

Parameter	Setting
Working electrode	DME
Mode	DP – Differential Pulse
Start potential	-0.1 V
End potential	-0.7 V
Peak potential iodate	-0.34 V

ELECTRODES

- Working electrode: Multi-Mode Electrode pro with standard glass capillaries
- Reference electrode: Ag/AgCl/KCl (3 mol/L) reference electrode with electrolyte vessel.
Bridge electrolyte: KCl (3 mol/L)
- Auxiliary electrode: Platinum rod electrode

RESULTS

The determination of iodate in electroless nickel plating baths can be carried out in a simple and straightforward manner. The method is selective and free of interferences. It is suitable for concentrations in the low mg/L range.

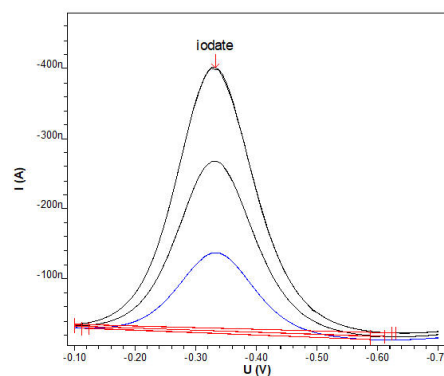


Figure 2. Determination of iodate in an electroless nickel bath with two standard additions.

Table 2. Result

Sample	Concentration IO_3^- [mg/L]
Electroless nickel bath	2.5

Internal reference: AW CH4-0475-092007

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CONFIGURATION



884 Professional VA semiautomated für Multi-Mode Electrode (MME) with 2 Dosinos

884 Professional VA semiautomated for Multi-Mode Electrode (MME) is a convenient high-end routine analyzer for trace determinations with voltammetry and polarography with the Multi-Mode Electrode pro or the scTRACE Gold. 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.

2x 800 Dosinos (supplied) permit the automatic addition of auxiliary solutions during the determination, e.g., electrolyte, buffer or standard solutions.

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

The 884 Professional VA semiautomated for Multi-Mode Electrode (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 Multi-Mode Electrode pro for Professional VA instruments

Complete electrode set for polarographic and voltammetric determinations. Includes Multi-Mode Electrode pro, reference electrode, platinum auxiliary electrode, measuring vessel, stirrer, electrolyte solution and additional accessories for setting up and operating the Multi-Mode Electrode.

viva 2.1 Full CD: 1 license

Computer program for control and data management of Professional VA/ CVS instruments. The software permits checks, data acquisition, evaluation, and monitoring, as well as report generation.

Graphic user interface for routine operations, extensive database programs with reevaluation, graphic method editor with numerous templates, system configuration, very flexible user administration, extensive data export functions, individually configurable report generator.

Includes the measuring modes "Differential Pulse" (DP), "Square Wave" (SQW), "Cyclic Voltammetric Stripping" (CVS), "Cyclic Pulse Voltammetric Stripping" (CPVS), and Chronopotentiometry (CP). The following calibration techniques are supported: standard addition, external calibration, DT (Dilution Titration), LAT (Linear Approximation Technique), MLAT (Modified Linear Approximation Technique), RC (Response Curve).

Dialog languages: German, English, Chinese.

The following instruments are supported:

884 Professional VA, 894 Professional CVS

1 license for a maximum of 4 Professional VA/ CVS instruments on a single PC.