



Application Note AN-V-200

Determination of thiourea in copper electrorefining solutions

Precision meets simplicity with the Multi-Mode Electrode pro

In the copper electrorefining process, chemical additives such as thiourea are utilized to enhance electrolytic refining and regulate the grain size of copper deposits. Precise quantification of thiourea is crucial for ensuring the quality of the refined copper. This requires its direct analysis in copper concentrates that contain sulfuric acid and trace amounts of chloride. However, the presence of chloride can interfere with the analysis. This Application Note introduces a voltammetric method for the accurate quantification of thiourea in

copper electrolytes. The main advantage of this method lies in its ability to precisely determine thiourea levels even in the presence of high chloride concentrations within the sample matrix.

With precise control over thiourea levels, the copper refining process can be adjusted more precisely, leading to improvements in the consistency and quality of the refined copper.

This method offers a simple and precise solution for maintaining optimal levels of thiourea.

SAMPLE

Cu electrorefining electrolyte

EXPERIMENTAL

Add the sample and the electrolyte solution into the measuring vessel and degas it for 5 min. The interfering effect of chloride is mitigated through the addition of masking analyte. The determination is carried out using parameters listed in **Table 1**. Quantification is done with the 884 Professional VA manual for MME (**Figure 1**) using two standard additions with thiourea standard addition solutions.



Figure 1. 884 Professional VA manual for MME

Table 1. Parameters

Parameter	Setting
Mode	DME
Start potential	0.3 V
End potential	0.2 V
Sweep rate	2 mV/s
Peak potential Thiourea	0.26 V

ELECTRODES

- Multi-Mode Electrode pro

RESULTS

Figure 2 presents the result of the determination in an electrorefining solution containing 0.75 mg/L thiourea.

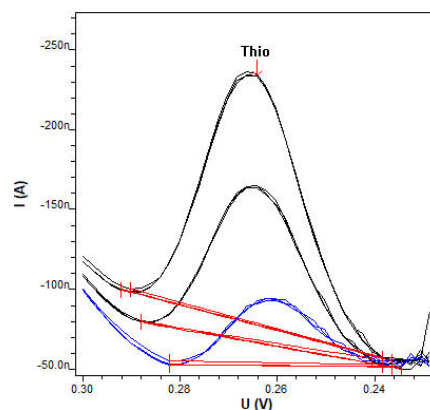


Figure 2. Determination of thiourea in an electrorefining electrolyte containing 0.75 mg/L thiourea

Table 2. Result

Sample	Thiourea in mg/L
Cu electrorefining electrolyte	0.71

Internal references: AW DE4-0164-102004

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CONFIGURATION



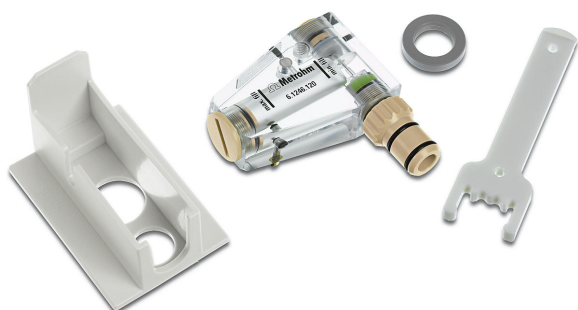
884 Professional VA manual for Multi-Mode Electrode (MME)

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.



Multi-Mode Electrode pro

Mercury electrode for voltammetry. Can be operated as DME, SMDE or HMDE.