



## Application Note AN-V-240

# Determination of total iodine in thyroid tablets with polarography

Polarography in pharmaceutical analysis: indirect determination of iodine after dry ashing in a muffle furnace

Thyroid hormones are made by the thyroid gland and play an important role in regulating metabolism and growth. Iodine acts as a building block and the specific number of iodine atoms determines the type of the hormone: four for thyroxine (T4) and three for triiodothyronine (T3). The number of iodine atoms is critical for the functionality of thyroid hormones. Levothyroxine and liothyronine (synthetic forms of thyroid hormones T4 and T3) are essential components of thyroid tablets. T4 is less active

and needs to convert to the more active T3 to be fully effective. Accurate iodine determination in thyroid tablets is a crucial quality control measure, ensuring the effectiveness and safety of thyroid treatments.

A robust method is introduced for indirect determination of total iodine content in thyroid tablets as iodate, according to United States Pharmacopeia (USP) guidelines using the 884 Professional VA and the Multi-Mode Electrode pro.

## SAMPLE

Commercially available thyroid tablet containing

100 µg levothyroxine and 20 µg liothyronine.

## EXPERIMENTAL

Sample preparation and the determination of iodine is carried out according to the USP monograph «Thyroid Tablets». The process involves dry ashing of the tablets, where organically bound iodine is released and later converted to iodate. The iodate content is determined with the 884 Professional VA (Figure 1) by differential pulse polarography.



Figure 1. 884 Professional VA.

## ELECTRODES

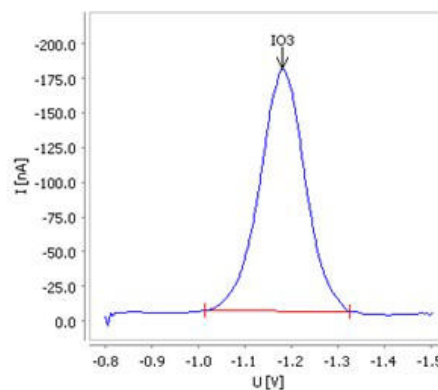
- Working electrode: Multi-Mode Electrode pro
- Reference electrode: Ag/AgCl/KCl (3 mol/L) reference electrode with electrolyte vessel.  
Bridge electrolyte: KCl (3 mol/L)
- Auxiliary electrode: Platinum rod electrode

Table 1. Parameters for IO<sub>3</sub> determination

Parameter	Setting
Working electrode	DME
Mode	DP – Differential Pulse
Start potential	-0.8 V
End potential	-1.5 V
Potential step	0.005 V
Potential step time	1 s
Pulse amplitude	0.05 V
Peak potential iodate	-1.18 V

## RESULTS

Calculation of the results was carried out according to the USP monograph «Thyroid Tablets».



**Figure 2.** Determination of iodate in a thyroid tablet by differential pulse polarography with the 884 Professional VA and the Multi Mode Electrode pro.

**Table 2.** Results of iodine determination with the 884 Professional VA and the Multi-Mode Electrode pro.

Sample	Iodine in g / tablet	Recovery rate
Tablet	70.59	92.3%
Tablet spiked with 72.55 g	144.58	101.9%

Internal reference: AW VA CH-0633-042024

## CONTACT

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## CONFIGURATION



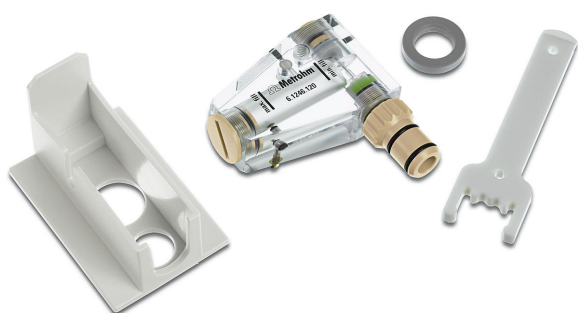
### (MME) 884 Professional VA manual

マルチモード電極 (MME) のための 884 Professional VA manual は、マルチモード電極 pro、scTRACE Gold または滴下ヒスマス電極を使用したホルタンメトリーおよびホーラロクラフィーによるハイエント微量分析へのエントリーレベル装置です。高性能のホテニョスタット/カルハノスタットと、非常に柔軟な viva ソフトウェアとのコンビネーションにおける熟練した Metrohm の電極技術が重金属の測定に新たな展望を開きます。性能が認証されたキャリフレータの付いたホテニョスタットは、各測定前に自動的に新たに調整を行い、可能な限り高い精度を保証します。

この装置と組み合わせることで、例えばCVS (サイクリックホルタンメトリーストリッピング)、CPVS (サイクリックハルスホルタンメトリーストリッピング)、CP (クロノホテニョメトリー) による電気めっき浴内の有機添加物の測定など、回転ディスク電極による測定を実施することも可能となります。交換可能な測定ヘッドにより、異なる電極を持つ様々なアプリケーション間の迅速な交換が可能となります。

コントロール、データ処理および評価のためにソフトウェア **viva** が必要となります。

884 Professional VA manual MME仕様は、多数の付属品およびマルチモード電極 pro のための測定ヘッドを付属して納品されます。電極セットおよび **viva** ライセンスは別途ご注文ください。



### Multi-Mode Electrode pro

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