



Application Note AN-V-057

Thiomersal in eye drops

Voltammetric determination of preservative in vaccines and various pharmaceutical and cosmetic solutions

Thiomersal (also called thimerosal) is a mercury containing organic molecule that has been widely used as preservative for vaccines and eye drops. Other applications of this substance have been for ear drops, storage and cleaning solutions for contact lenses, and in tattoo inks. It is very effective, even in very low concentrations, against a wide range of microorganisms and viruses.

To reduce the risk for consumers the maximum concentration of mercury in the products is limited by the authorities. Typical limit values in

the European Union are 0.007% (as Hg) in eye products (EU Commission Regulation 1223/2009) or up to 25 μg thiomersal per vaccine injection dose if vaccines are distributed in multi-vaccine containers.

Polarography or voltammetry can be used to accurately determine the concentration of thiomersal in vaccines or other cosmetic and pharmaceutical solutions (such as eye drops). The method is simple to perform, specific, and free of interferences.

SAMPLE

Vaccine against diphtheria, tetanus, pertussis

EXPERIMENTAL

The sample and the supporting electrolyte are pipetted into the measuring vessel. The determination of thiomersal is carried out with an 884 Professional VA using the parameters specified in **Table 1**. The concentration is determined using external calibration with a calibration curve recorded from five standard concentrations.



Figure 1. 884 Professional VA.

Table 1. Parameters for voltammetric analysis of thiomersal in vaccine

Parameter	Setting
Working electrode	HMDE or DME
Mode	DP – Differential Pulse
Deposition	none
Start potential	-0.2 V
End potential	-0.6 V
Peak potential thiomersal	-0.45 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 thiomersal can be carried out in a simple and straightforward manner with voltammetry. The method is selective and free of interferences.

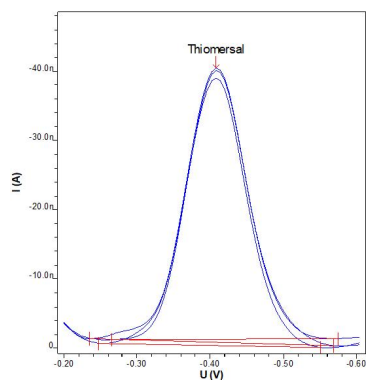


Figure 2. Determination of thiomersal in vaccine sample.

Table 2. Results of the thiomersal determination with the 884 Professional VA

Sample	Thiomersal [mg/L]
DTP vaccine	102

Internal reference: AW BR4-0002-072011

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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。



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.