Application Note AN-V-057

滴眼液中的硫柳汞

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.

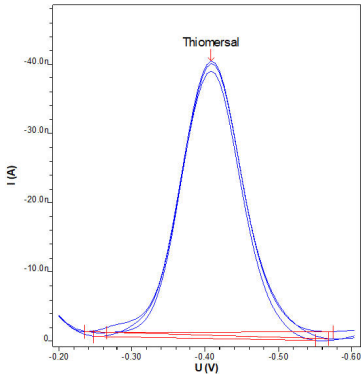

Figure 2. Determination of thiomersal in vaccine sample.

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

CONTACT

瑞士万通中国
北京市海淀区上地路1号院
1号楼7702
100085 北京

marketing@metrohm.com.cn

CONFIGURATION

(MME) 884 Professional VA manual

用于多模式（MME）的 884 Professional VA manual 是借助多模式 pro 或 scTRACE Gold 或液滴使用伏安法和法行痕量分析的入器。此已的瑞士万通技与恒位/恒位以及外接的活 viva 件用,在重金属定域中展了新的前景。有的校准器的恒位在每次量之前均自冲洗行校准,保可能的高精度。

通此器也可使用旋行定,例如借助«循伏安溶出法»(CVS)、«循脉冲伏安溶出法»(CPVS)和位法(CP)定池中的有机添加。借助可更的量,可在使用不同的各用之快速切。

使用 viva 件行控制、数据采集和估。

用于 MME(多模式)的 884 Professional VA manual 供配大量附件,包括用于多模式 pro 的量。和 viva 可独。

VA pro Professional VA

整套,用于和伏安定。包含多模式 pro、参比、助、量杯、拌器、解溶液和其它用于建工作台以及行多模式的附件。