



Application Note AN-RS-027

苹果中硫胺的痕量检测

Protecting consumer safety with Misa

Thiram is used extensively as a fungicide and parasiticide to prevent disease in crops and as an animal repellent to protect trees and ornamental plants. However, extensive toxicological studies conclude that chronic, high-level exposure can cause considerable organ damage to land and aquatic species. While only moderately toxic to humans through skin exposure and ingestion, thiram is highly toxic if inhaled. To reduce its negative effects on health and the environment, the US defines maximum residue limits that vary for different food crops. In contrast, the EU recently banned thiram and is

moving to use pesticides that carry reduced health risks.

Using Misa (Metrohm Instant SERS Analyzer), low level detection of thiram on apples is achieved with guided workflows adapted for use by diverse testers. Misa Cal software automatically processes results and achieves chemical identification by matching to either proprietary, user-created, or commercially available spectral libraries. Results can be geotagged and shared immediately with the accompanying chemical hazard information.

INTRODUCTION

This application note describes a simulated test procedure for detecting thiram residue on apple skin. The assay is based on the acquisition of

SERS-specific spectra for thiram using Misa and Metrohm Raman's proprietary silver P-SERS substrates.

REFERENCE SPECTRUM AND LIBRARY CREATION

To establish a reference spectrum, a pure thiram standard at a concentration of 500 µg/mL in ethanol was analyzed using silver (Ag) P-SERS

strips. The unique SERS spectrum shown in **Figure 1** can be used to create a library entry for thiram.

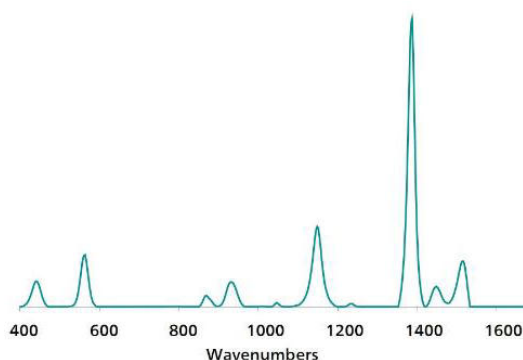


Figure 1. Standard SERS reference spectrum of thiram.

EXPERIMENT

To simulate rapid testing, 25 L aliquots of 1000, 100, and 10 g/mL thiram in ethanol were applied to 2 cm² sections of apple skins washed with water and dried. After thorough drying of the test sections, Au P-SERS test strips were dipped in ethanol and immediately swabbed in a circular motion within treated sections on the apple skin. Each strip was dried for 5 minutes and then placed in the P-SERS attachment on Misa for measurement.



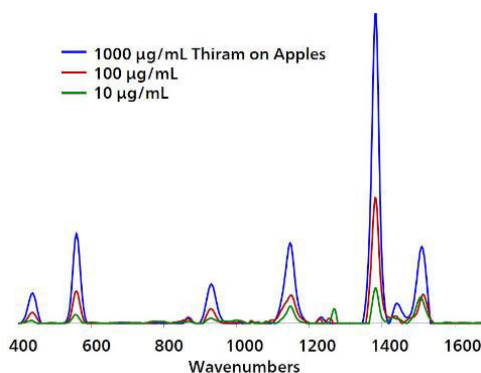
Table 1. Experimental parameters

Instrument		Acquisition	
Firmware	0.9.33	Laser Power	5
Software	Misa Cal V1.0.15	Int. Time	5 s
Misa Vial Attachment	6.07505.030	Averages	10
ID Kit - Ag P-SERS	6.07506.470	Raster	ON

RESULTS

Overlaid and baseline-corrected spectra acquired for swabs of an apple skin treated with different

concentrations of thiram show detection down to 10 g/mL (**Figure 2**).

**Figure 2.** Overlaid baseline-corrected spectra acquired from Ag P-SERS swabs show detection of thiram on apple skins to 10 µg/mL.

FIELD TEST PROTOCOL

Detection of thiram in the field

Dip the printed end of a P-SERS strip into ethanol. *Touch only the unprinted back side of the swab with your gloved hands.* Use the moistened, printed side of the strip to swab the peel of an apple. Rub the

strip in a circular motion. After drying for 5 minutes, insert the Ag P-SERS strip, with the printed portion facing down and toward the instrument, into the P-SERS attachment for measurement.

Table 2. Requirements for field test protocol

ID Kit - Ag P-SERS		6.07506.470
includes:	Silver P-SERS	
	Scoop	
	Disposable pipettes	
	2 mL glass vials	
Reagents		Ethanol
Test settings		Use ID Kit OP on MISA

CONCLUSION

Misa is a highly sensitive, cost-effective system for the unambiguous identification of pesticide residue on fruit. Its user-friendly analyses paired with smart

software in a compact, portable format make it a powerful solution for field detection of food adulterants.

CONTACT

Metrohm Taiwan Ltd.
46 5
108

info@metrohm.com.tw

CONFIGURATION



MISA Advanced

Metrohm Instant SERS Analyzer (MISA) 是一款高性能、便携式分析系统,可快速检测/鉴定非法物质、食品添加剂和微量食品污染物。MISA 的特点是配备了 Metrohm 的轨道光栅扫描 (ORS) 技术设备的光谱仪。其空间需求小和并且电池寿命有所延长,适用于现场测试或移动实验室应用。MISA 提供各种 1 级激光附件,可灵活选择取样。该分析仪可通过 Bluetooth 或 USB 连接运行。

MISA Advanced 套件是一个完整套件,其作用是让用户能用 Metrohms 纳米颗粒溶液和 P-SERS 试剂条进行分析。

MISA Advanced 套件包含了一个 MISA 小管附件、一个 P-SERS-附件、一个 ASTM 校正标准件、一个 USB 迷你电缆、一个 USB 供电单元和用于运行 MISA 仪器的 MISA Cal 软件。还随供了一个用来安全保管仪器和附件的坚固保护箱。



ID - -P-SERS (Ag P-SERS)

ID 套件 - Ag P-SERS 包含了 Mira/Misa 用户使用银-P-SERS 基材进行 SERS 分析所需的组件。该套件包含了一个一次性抹刀、一个移液管、样品小瓶和 2 个银-P-SERS 试剂条。