

Screening Envelopes and Parcels for Illicit Materials with Agilent Resolve—a Handheld SORS System



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Introduction

The Agilent Resolve Raman handheld through-barrier identification system uses Agilent proprietary spatially offset Raman spectroscopy (SORS) technology to identify hazardous materials, explosives, and narcotics concealed behind single and multiple barriers. These barriers can include colored and opaque plastics, glass, paper, card, wrapping, and fabric.

The nonintrusive, through-barrier capability removes the need to open parcels. This means that sender privacy is not compromised, and potential hazards remain contained. Items can be examined without the need for extra protective equipment or chemical handling facilities.

This Application Note details how the Resolve system easily identifies chemicals through combinations of padded envelopes and opaque plastic containers. This operation can be done in approximately one minute, without any of the parcels being opened.

Experimental

To conduct a Resolve system measurement, simply select the container type. The tests described are through-barrier measurements (Thick, Colored, or Opaque selected) (Figure 1).



Figure 1. Selections for through-barrier, point-and-shoot, or glass vial measurements.

Conventional line-of-sight surface scan mode can also be used to identify materials if the packaging has been opened (Figure 2). A vial holder mode is also available.



Figure 2. Line-of-sight surface scan mode.

The ability of Resolve to identify materials concealed inside packaging typically used in mail items has been tested extensively in collaboration with laboratories in the UK, USA, and China. Hazardous narcotics are discussed in more detail in a separate Application Note (5991-8877EN).

Examples of materials tested

- Narcotics
- New psychoactive substances
- Medicines
- Benign chemicals

Also available

- Explosives
- Toxic industrial chemicals
- Chemical agents

Measurements and Results

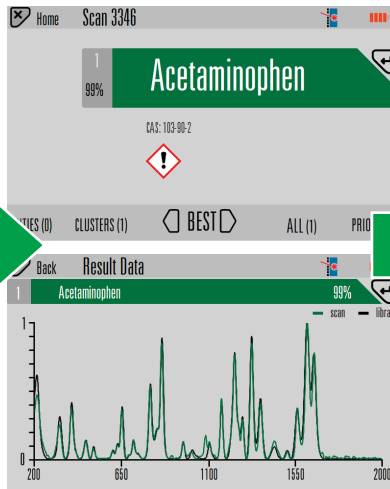
Three measurements are presented where a sample was correctly identified through combinations of packaging materials (Figure 3). The samples included tablets and powders. All materials are correctly identified regardless of the presence of one or more layers of barrier material.

- Scan times are adjusted automatically based on the Raman signal strength, but typically take approximately one minute.
- The single best-match result is presented, however, other modes are available.
- Library items can be tagged as a Priority when searching for specific materials. Priority matches display in red, and all other matches are displayed in green.

Acetaminophen



Padded yellow envelope

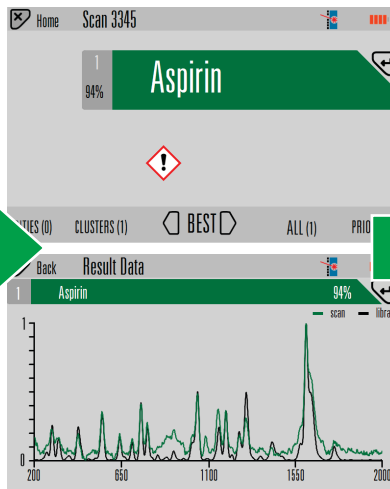


Inside is a white powder in a clear plastic bag

Aspirin



Padded white envelope

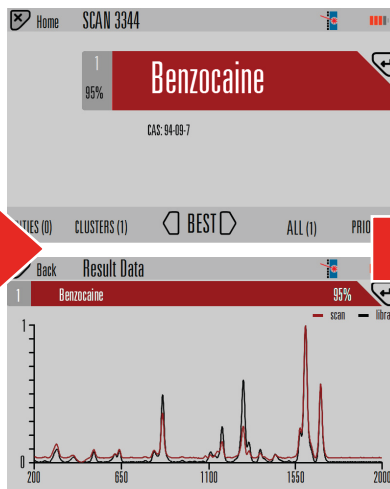


Inside are tablets in a thick yellow HDPE plastic tub. Aspirin is the major component of these tablets

Benzocaine



Padded white envelope



Inside is a powder in a white HDPE plastic pot

Figure 3. Results from three measurements conducted through multiple layers of common parcel packaging materials.

Conclusions

The Agilent Resolve system easily identifies chemicals through combinations of padded envelopes and opaque plastic containers. This identification is done in approximately one minute, without any of the parcels being opened.

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