



Raw Materials ID in Sterile Manufacturing

Avoiding contamination in the manufacture of parenteral, intra-venous and other sterile products is essential. However, verifying the identity of incoming materials typically involves opening the packaging and exposing both the contents and the operator. Cobalt's RapID instrument verifies material identity through unopened non-

transparent containers. This note highlights RapID's ability to analyse materials typically used in parenteral manufacture without compromising the container's seal.

Non-invasive ID Testing

For raw materials received at pharmaceutical manufacturing plants identity testing is mandatory and highly resource intensive. Often the materials must be stored in quarantine before being opened in a sampling booth, tested or sampled with a sampling spoon and re-sealed. Avoiding this expensive and time-consuming process used to be impossible for most incoming goods testing until Cobalt launched its RapID non-invasive materials verification instrument.

RapID allows materials verification through unopened sacks, tubs, bottles, FIBCs and plastic barrels – in fact, most non-transparent or coloured materials such as paper, plastic, glass and multi-layer sacks. When supplied as powders or liquids in opaque containers spectroscopic identification is often impossible without exposing the contents. RapID speeds up testing by enabling identity verification in the warehouse shortly after delivery; however, another benefit is that the container remains sealed. For incoming raw materials testing this means there is no need to sample the containers, making 100% inspection cost-effective.

Preventing contamination is particularly important in injectable and intra-venous product manufacture as the cost of downtime and lost product can be significant. Also, contamination of injected products can be much more harmful to a patient, often already critically ill, than those taken by other means.

Testing Materials used in Sterile Production through the Container

Below, a number of typically-used parenteral ingredients are analysed by RapID through the original unopened packaging using spatially offset Raman spectroscopy¹ (SORS). The data shown are the SORS model spectra obtained for the material used for ID verification. Note, for routine ID testing using RapID the spectra are not displayed but a pass/fail is used based on a correlation with the model spectrum. The verification can be performed in an office or in a warehouse and does not require sterile or laboratory conditions.



RapID Instrument

¹ *Non-invasive identification of incoming raw pharmaceutical materials using Spatially Offset Raman Spectroscopy*, JPBA, 76 (2013) 65–69.

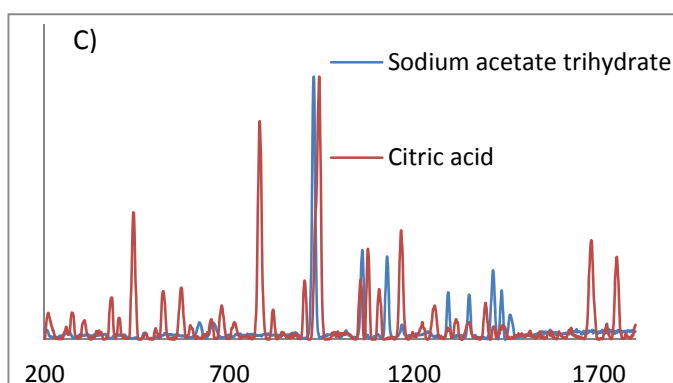
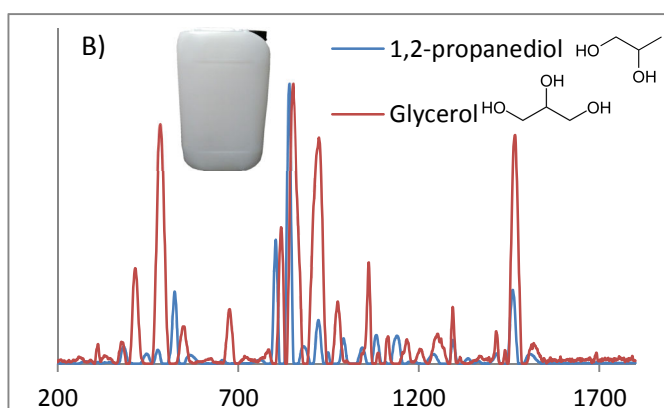
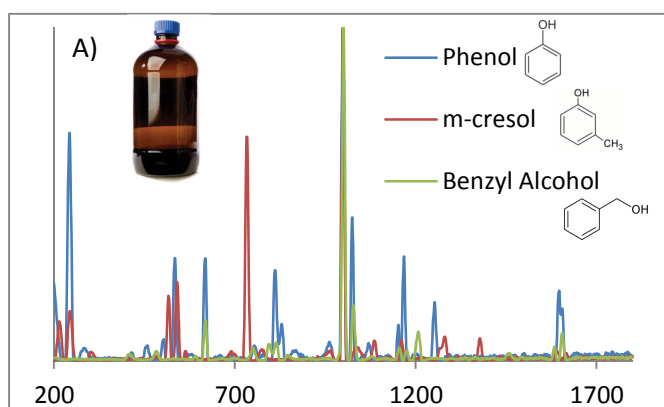
Liquid materials

Liquids such as phenol, benzyl alcohol and *m*-cresol are commonly used, are chemically similar and are typically supplied in 1 or 2 litre brown glass bottles. These small containers mean that the number of bottles received per annum is often very high. A), opposite, shows the spectra obtained through brown glass bottles in 5-7 seconds. They are distinguished 100% of the time.

Other liquid excipients, such as ethanol, glycerol and 1,2-propanediol may be supplied in plastic barrels. These materials are difficult or impossible to analyse spectroscopically by NIR or conventional hand-held Raman instruments. B), opposite, shows the spectra obtained through opaque plastic barrels.

Solid materials

Salts are often used in injectable products. Monatomic ionic compounds do not have a Raman spectrum unless they are chemically bound with water, so sodium chloride (NaCl) cannot be detected by conventional Raman spectroscopy but MgCl₂·6H₂O and CaCl₂·2H₂O can be identified through unopened paper and plastic sacks. Generally, solids can be measured through plastic/paper sacks (e.g., citric acid) and HDPE bottles (e.g., CH₃CO₂Na·3H₂O).



SORS Spectra of common materials through their containers.
X-axes in wavenumbers (cm⁻¹), Y-axes normalised.

Material	Container	RapID analysis time
Phenol, benzyl alcohol, <i>m</i> -cresol	Brown glass bottle	5-7 seconds
Citric acid, MgCl ₂ ·H ₂ O, CaCl ₂ ·2H ₂ O	Plastic/paper sacks	10-15 seconds
Propane-ols, ethanol	Plastic barrel	10-15 seconds
Sodium acetate trihydrate	HDPE bottle	10-15 seconds
Acetic acid	Plastic bottle	10 seconds

Summary

RapID can successfully and quickly verify the identity of many commonly-used materials without compromising the container's seal, preserving sterility. Analysis times are fast and verification is robust and repeatable through a wide range of different packaging types.

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