TECHNICAL NOTE

No. 202-v1.9

Type H kit for TruNarc

Solution kit enhances real-world ability of field-based analyzer

Key Words
Narcotics, fentanyl, heroin, Raman spectroscopy, fluorescence, field testing

Introduction

Many common controlled substances are easily identified with the Thermo Scientific™ TruNarc™ analyzer, using point-and-shoot analysis. Some substances, however, exhibit fluorescence or are present in very low concentrations. These target samples can present a challenge for Raman spectroscopy, requiring an additional step to ensure successful analysis.

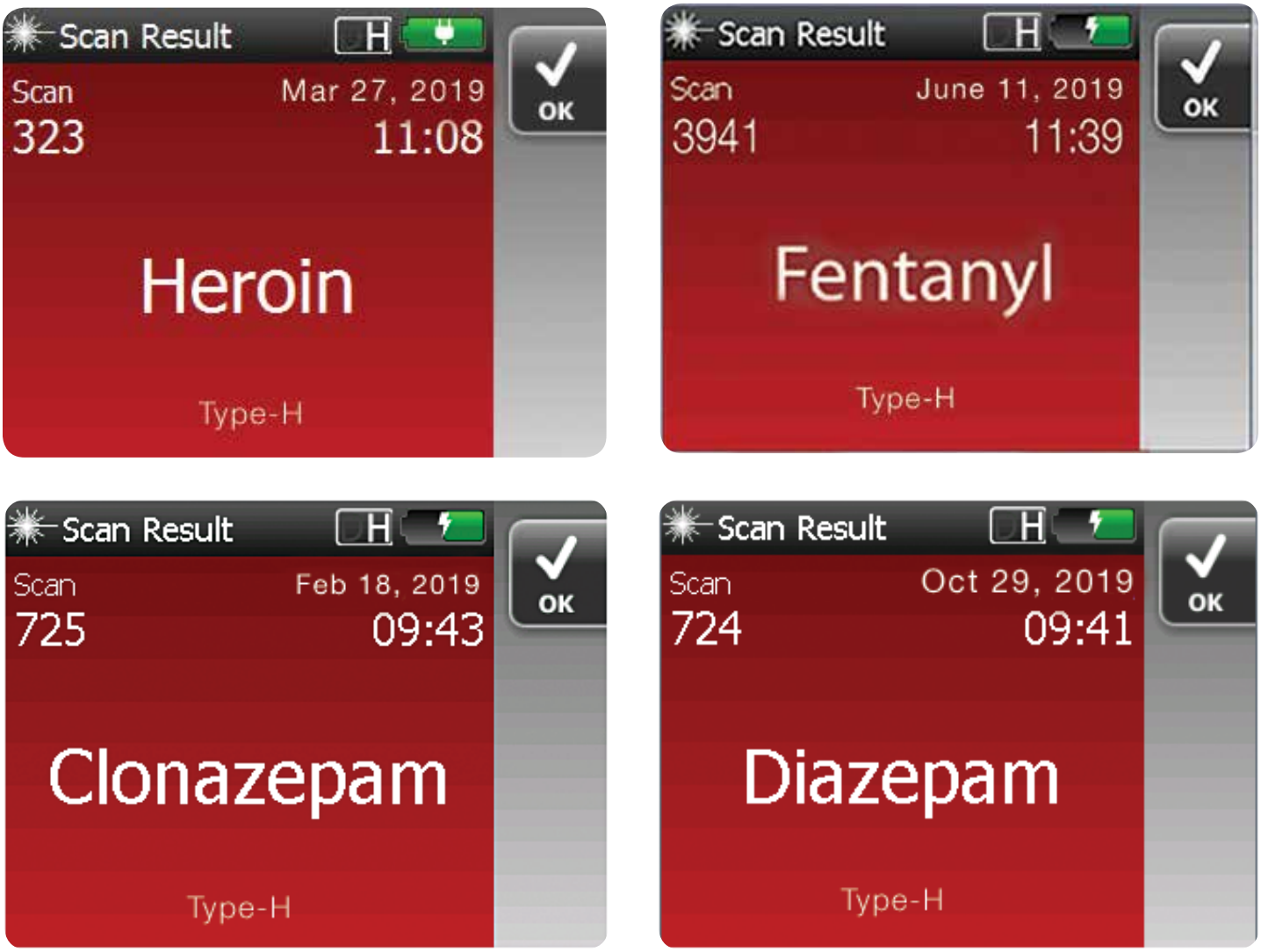
Many of the most common controlled substances, such as cocaine and methamphetamine, are highly amenable to Raman spectroscopy and present few analysis challenges. The TruNarc analyzer has been successfully deployed for presumptive analysis of these and other suspected narcotics worldwide.

However, a phenomenon known as fluorescence can mask the Raman spectrometry signal of some narcotics, much like glare from sunlight can mask the subject in a photo from a camera. Fluorescence can hinder data collection of some narcotics, such as street heroin.

In addition, the target chemical in suspected narcotics may not be present in high enough concentration for conventional Raman spectroscopy to identify it. For instance, the active components in some prescription drugs are in a very low concentration, making identification a challenge.

To overcome these challenges – yet maximize the benefits of a handheld Raman analyzer – we have developed a Solution Kit (Type H) that enhances the Raman signal of the target substance while decreasing any nuisance fluorescence.

Figure 1. A selection of "Alarm" screens when using the Type H kit



Recommendations for Type H kit use

Initially, TruNarc users should scan a sample using point-and-shoot mode. If this approach leads to an "Inconclusive" or "Clear" result and a specific narcotic is believed to be present, the operator should apply the Type H kit. The kit could be used to help identify these items:

- 2C (Phenethylamines – 2C-B, 2C-E, 2C-I)
- Cocaine
- Fentanyl Compounds^+
- Heroin
- Methamphetamine^
- NBOMe (25B-NBOMe, 25C-NBOMe, 25I-NBOMe)
- Synthetic cannabinoids (sprayed onto leaf materials)
- Tablets, including:
  - Alprazolam
  - Buprenorphine#*
  - Clonazepam*
  - Diazepam
  - Hydromorphone*
  - Lorazepam*
  - MDMA*
  - Oxycodone*
  - Oxymorphone*

Both tablets and strips are identifiable using the Type H Kit.

* Some low dose pills require a Type H Kit for identification.

^ Combined results: will show "Fentanyl Compound or Methamphetamine"

+ Fentanyl Compound includes fentanyl and fentanyl analogs.

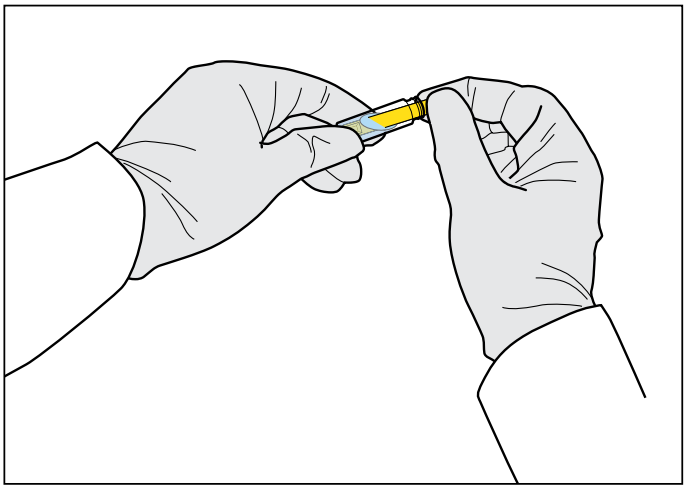
How to use the Type H kit

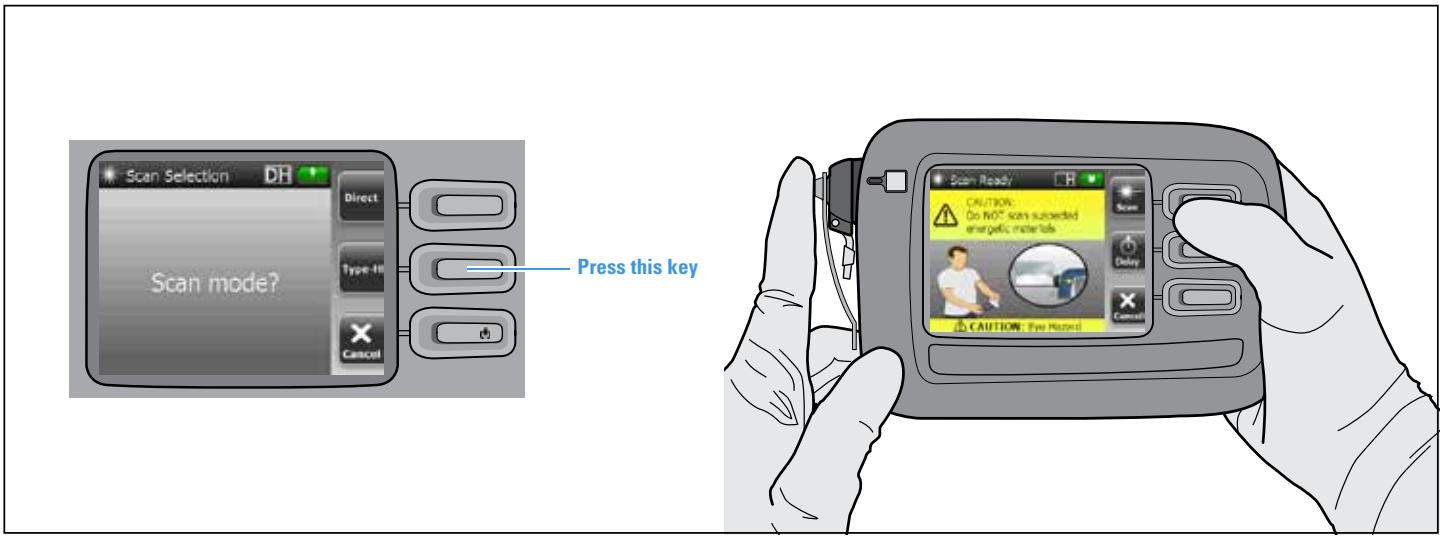
The Type H test kit is made up of two components: a test stick and a test vial. The vial contains 1ml of ethanol that is used to dissolve a small amount of the sample. The test stick is used first to scoop the material from the sample or a piece of tablet and transfer it to the vial.

The stick contains a metal substrate at the base of the scoop. After the chemical(s) are dissolved in the ethanol, the test stick is submerged into the vial, coating the metal substrate with the solution. The test stick is then removed, allowed to dry, positioned against the TruNarc analyzer, and scanned. See Figure 2

This method has been shown to increase the spectrum strength and reduce the amount of fluorescence for certain samples.

Figure 2. Process for analysis using a TruNarc Type H kit





Science behind the Type H kit

The roughened metal surface on the Type H test stick has two primary attributes. First, the surface quenches the fluorescence, the phenomenon that may prevent analysis of the bulk material. Second, the surface enhances the Raman signal of the molecules adsorbed onto the surface of the roughened metal, which allows analysis of very small amounts of material.

When the TruNarc analyzer is used to measure the Type H stick, the laser light is focused onto the metal surface. As with point-and-shoot analysis, the spectrometer measures the unique spectral fingerprint of the molecules, and then compares the data collected with the on-board TruNarc library.

It should be noted that the spectra obtained on the test stick are different from those of a conventional Raman spectrum. To enable these new applications using the Type H Kit, Thermo Fisher Scientific scientists create a library item for each unique chemical using certified laboratory standards.

Summary

The Type H test kit further enhances the real-world utility of the TruNarc analyzer, enabling users to screen for specific narcotics that are fluorescent and/or at low concentration. A key enhancement is the ability to use the TruNarc analyzer to screen for such emerging synthetic opioids as fentanyl, fentanyl analogs, heroin and methamphetamine. Several low dose tablets are also identifiable using the Type H test kit in conjunction with the TruNarc analyzer for presumptive narcotics identification.

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