



Using the Type H2 Kit with the TruNarc Delta Analyzer

Introduction

The Thermo Scientific TruNarc Delta Handheld Narcotics Analyzer offers versatile chemical identification capabilities through its two operational modes: Direct Scan and the Type H2 Kit. Direct Scan mode is ideal for rapid identification of substances through containers without the need for sample preparation, making it highly effective and safe for handling potentially harmful chemicals. For more challenging scenarios involving low-concentration chemicals, fluorescent chemicals, or dark-colored compounds that may burn when exposed to a laser, the Type H2 Kit, utilizing Surface-Enhanced Raman Spectroscopy (SERS), provides enhanced detection capabilities. The Type H2 Kit requires easy sample preparation on a proprietary nano-textured metal surface, which greatly boosts the spectral signal-to-noise ratio and allows the TruNarc Delta to detect lower concentrations of chemicals that may otherwise go undetected using Direct Scan mode.

What is in the Type H2 Kit?

1. 4 mL glass vial for methanol
2. Plastic Type H2 Test stick that holds a small, specially treated gold-colored substrate
3. Wooden spatula for sample transfer into the glass vial – 100 spatulas are provided with the Type H2 Kit.



Figure 1. Items that come with the Type H2 Kit: a small vial for methanol, the Type H2 stick with the metal substrate, and wooden spatulas for sampling.

Why use the Type H2 Kit?

- Substances are present in low concentrations (<10 wt%). The Type H2 Kit requires only 50 milligrams of a sample
- Substances are fluorescent, such as "black tar" heroin
- Requires simple sample preparation on a proprietary metal substrate
- Enhances Raman signal for better detection of low concentrations

Why use Direct Scan?

- Rapid chemical identification of field samples
- Most users prefer for ease of use and high identification rates
- No sample preparation required
- Scans through plastic bags or glass vials for operator safety

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Using the Type H2 Kit

Setting Up the Solution Vial and Sample Preparation

1. Always wear gloves to protect yourself from the sample and any possible residue.
2. Obtain a Type H2 test stick package and a methanol vial from the Solution Kit.
 - Check the expiration date on the package and the vial label to ensure it is current. Do not use if expired.
3. Prepare the vial:
 - If you have pre-filled vials: open one and place it on a stable surface.
 - If you have empty vials: add approximately 1-2 mL of 99.8% methanol, then place it on a stable surface.
4. The sample to be analyzed should be loose powder, ideally. If present in small granules, attempt to use the most finely ground material.
5. Using the wooden scoop, add a small amount (<50 milligrams) of the sample to the methanol vial. This is enough to cover the tip of the wooden stick, as shown below. Adding too much is not beneficial for this analysis.
6. It is not recommended to use the Type H2 stick as a scoop because the gold SERS substrate may get scratched or damaged, resulting in inconclusive Type H2 results, as shown in Figure 2 (right).

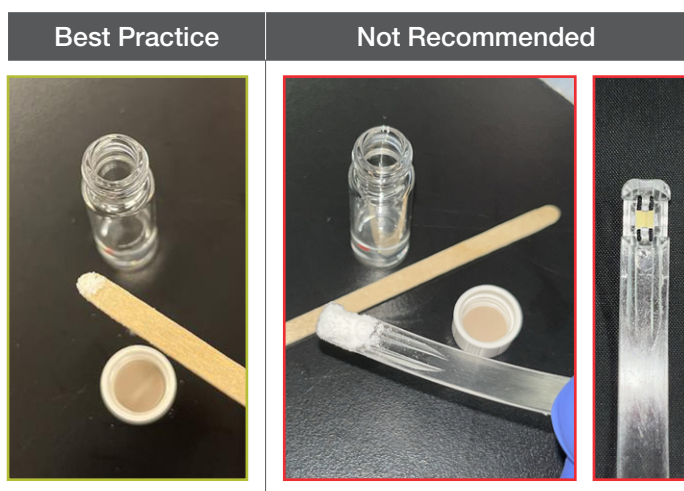


Figure 2. The best practice for sampling (left) illustrates the use of a small amount of material obtained with the side of a wooden spatula. Shown at right, using the substrate end of the Type H2 stick for sample scooping is not recommended.

7. Tightly close the methanol vial and shake vigorously for approximately 30 seconds to dissolve the sample.
 - The methanol may change color or become cloudy depending on the sample.
 - Note: most relevant narcotics are soluble in methanol, but many common cutting agents are NOT. Thus, the sample does NOT need to appear fully dissolved because narcotics will migrate into the liquid, which is then deposited onto the Type H2 substrate for analysis.
8. After shaking, allow the vial to sit for at least 3 minutes, allowing any potentially undissolved particles to settle to the bottom of the vial.
 - This step often helps filter out some of the insoluble cutting agents, preventing them from being deposited onto the SERS substrate.

Preparing the Type H2 Stick

1. Open the Type H2 stick pouch and place the stick on a clean, dry surface with the gold SERS substrate facing up.
 - Ensure that you do not touch or damage the SERS substrate and avoid touching the substrate end to minimize contamination.
 - Carefully open the methanol vial containing the settled sample.
 - Hold the Type H2 stick in one hand and tilt the vial at a 45-degree angle in the other.
2. Dip the Type H2 stick into the liquid layer, avoiding any solid material at the bottom. Ensure that the entire metal substrate is submerged before gently rocking the stick back and forth for 10-15 seconds in the liquid before removing it.
3. Onto a level surface, lay the stick flat with the gold SERS substrate facing upwards and allow to dry.
4. Now place the cap of the methanol vial under the stick handle to ensure that the SERS substrate is drying in a level position.
5. After 2-3 minutes, check if the substrate is completely dry.
 - A fully dry SERS substrate appears uniform in color with a matte finish.
 - Avoid shaking the stick to speed up drying, as this may displace the sample.
 - Note that environmental conditions, such as temperature and humidity, can affect drying time.

Analysis of Type H2 Stick using TruNarc Delta

1. After the Type H2 stick substrate is completely dry, insert the stick into the nose cone horizontally as shown in Figure 3 below.
 - Ensure that the gold SERS substrate is facing the analyzer so that the laser will analyze the substrate and not the plastic stick.
2. Place your finger on the back of the Type H2 stick's substrate with slight pressure to ensure it is well seated in the nose cone. Remove your finger before analysis.



Figure 3. Recommended Type H2 stick placement for analysis.

3. On the TruNarc Delta Analyzer, select "Scan", then "Type-H", followed by "Scan" to initiate a scan as shown in Figure 4 below.
 - During the analysis, make sure that the stick does not touch anything that could detach it from the nose cone.



Figure 4. On-screen workflow for scanning in Type H mode.

4. Upon scan completion, the results screen will appear. Example shown below in Figure 5.

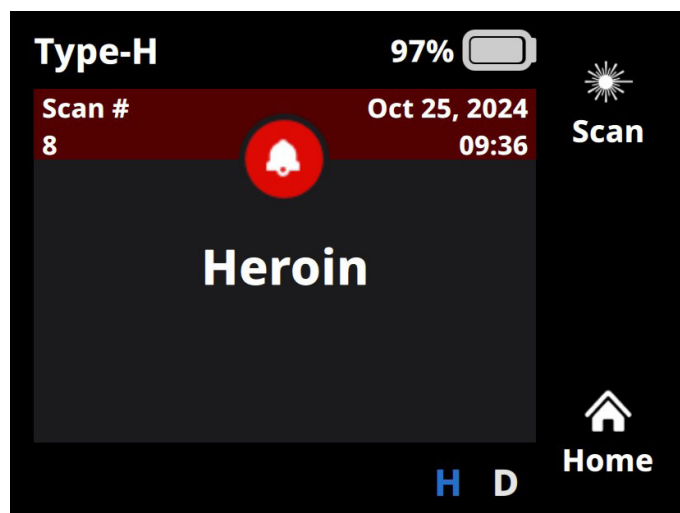


Figure 5. Type H result for Heroin, with a red banner and bell indicating the detection of an Alarm item.

Conclusions

The Type H2 Kit for the TruNarc Delta and Tau Handheld Narcotics Analyzers utilizes Surface-Enhanced Raman Spectroscopy (SERS) to identify narcotic mixtures in low concentrations and fluorescent samples, which are otherwise difficult to detect. By using the Type H2 Kit with a TruNarc Delta or Tau, law enforcement can more effectively combat the presence of fentanyl and other emerging synthetic opioids in street drugs. These substances, even in trace amounts, pose significant risks to community safety. Therefore, the Type H2 Kit is an essential tool in the ongoing effort to protect public health and ensure safer communities.

Learn more at thermofisher.com/trunarc

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