

Application Brief AB-039

A WHITE POWDER INCIDENT AND THE HAZMATID™

Receiving the Call

Two small deposits of white powder discovered in a restroom in an official government facility, located in Milford, CT, brought the entire building and the surrounding area to a standstill. Authorities were alerted by a woman who noted the white powder on two shelves in one of the women's restrooms in the facility. That discovery was cause for alarm because of past events, in which deadly spores of *bacillus anthracis* (anthrax) had been used to disrupt government offices nationwide. Taking no chances, authorities closed off the surrounding streets to all traffic and halted all facility operations. The suspicious white powder had to be identified quickly and accurately. In the event of a biological attack, the woman who discovered the powder would need medical treatment. On the other hand, if the powder were a false alarm, then normal operations could quickly resume. The local Fire Department, the State Police, and the state's Department of Environmental Protection Emergency Response Unit were called in to identify the powder and remediate the scene.

When the HazMat team arrived at the facility, among their tools was a HazMatID™ portable FTIR chemical identifier, used for identifying unknown solids and liquids. The emergency responders entered the building in Level B protective gear, carrying the HazMatID™. The system was set up in the Hot Zone near the white powder spill and was operational in only a few minutes. A small sample of the powder was placed on the HazMatID™, and the press handle engaged. In less than a minute, the substance was identified as infant formula containing protein, as shown in Figure 1. Once the identification was obtained, a more general test, that could only identify the presence of protein in the sample, provided a confirming result. Within 30 minutes after arriving on the scene, the HazMat team, with the aid of the HazMatID™, confidently determined that the suspicious white powder in the building was probably left inadvertently, and not out of malicious intent.

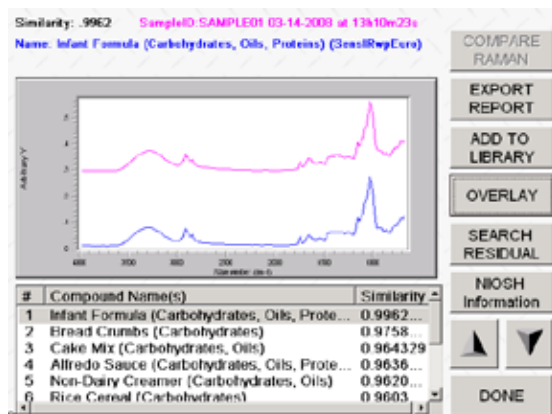


Figure 1. HazMatID™ touchscreen interface comparing measured spectrum of white powder sample and library spectrum for infant formula.



Figure 2 The HazMatID™, a rugged and portable FT-IR chemical identifier

What is the HazMatID™?

When HazMat responders are called to deal with a potentially dangerous or toxic substance, they need to know the identity of the material. The rugged and portable HazMatID™, as seen in Figure 2, provides that answer for solids, liquids, pastes, and powders in a matter of seconds. Toxic industrial chemicals, explosives, drugs, and even chemical warfare agents are identified with ease by non-specialist personnel. Operational in just a few minutes, the HazMatID™ requires only a tiny amount of sample, simplifying decontamination. The HazMatID™ is indeed a key component of any HazMat emergency responder toolbox.

With its very simple software, the HazMatID™ identifies materials by "molecular fingerprinting," similar to the procedure used to identify criminals. The basic process requires only a few steps, and takes about 30 seconds. No sample preparation is needed. The HazMat responder simply places a small amount of the unknown material directly on the HazMatID™ analysis area, as shown in Figure 3. With the HazMat responder following an easy-to-use touch screen interface, the HazMatID™ displays the IR absorption spectrum, which is the fingerprint of that material. It then compares that spectrum to libraries of known materials, and the best match is given as the likely identity of the substance. In addition, the HazMatID™ is capable of "learning" along the way, as spectral libraries are easily built and maintained by the user.

HazMatID™ Libraries Include:

- Common Chemicals
- Toxic Industrial Chemicals
- Chemical Warfare Agents
- Explosives
- Pesticides
- Forensic Drugs
- Regulated Drug Precursors
- Common White Powders

At the heart of the HazMatID™ system is the diamond ATR cell, based on attenuated total reflection (ATR) technology. Analysis requires that the sample make contact with the diamond sensor. For liquids, a tiny drop on the diamond is enough for identification. For solids and powders, an integrated pressure applicator ensures good contact so that even a few grains of a powder can be identified properly. Harsh or corrosive materials will not harm the diamond sensor or the stainless steel plate of the diamond ATR cell. Decontamination is achieved by cleaning the sample area with an appropriate agent such as hypochlorite solution.



Figure 3. The HazMatID™ can easily be used on site in protective equipment.

The HazMatID™ can be submerged for full decontamination after an incident. It is a fully compact and portable system, weighing 23 lbs. (10.43 kg). Power is supplied from a battery pack, from a vehicle cigarette lighter, or even from a normal 110 V AC line. The system is operational minutes after turning it on, and it can be powered up and down repeatedly. No user calibration procedures are required, as the system is constantly referenced to an internal Class 1 laser. Consumables are not needed for upkeep or calibration. Only the infrared source may need replacement every 3 - 5 years, which can be performed by the user in the field.

Summary

When faced with a completely unknown substance, HazMat emergency responders need as much information as possible. The HazMatID™ can identify unknown solids, liquids and powders quickly and reliably. For suspicious white powders, as discussed in this Application Note, the HazMatID™ can provide a positive identification. Indeed, the HazMatID™ is not the only tool that emergency responders need, but it can confirm results from other tests, and identify a substance when other techniques can only narrow the substance to a certain class. Combining technology that has been accepted in the field of forensics, and in the heavily regulated pharmaceutical industry, the portable and easy to use HazMatID™ is a powerful tool for HazMat emergency response.