CASE STUDY

Analysis Comparison of Street Fentanyl

The opioid abuse crisis is rapidly spreading throughout communities across the United States and the rest of the world. In 2015 alone, opioids were involved in the death of 33,091 US citizens – a number that has quadrupled since 1999[1]. In 2016, the Center for Disease Control (CDC) cited an additional increase of 28%, linking opioid abuse to more than 42,000 fatalities[2]. At 100 to 10,000 times the strength of morphine, fentanyl is typically used in small quantities and is often combined with other street drugs (such as heroine, cocaine and MDMA) or benign cutting agents to deliver the drug into a person's system. Even trace amounts that are invisible by the human eye can cause an overdose.

This crisis has first responders on alert and has unleashed a call to action for technology manufacturers to develop powerful solutions to detect and identify trace quantities of this mighty drug. Here we outline a real-world scenario that demonstrates the detection capabilities of several go-to first responder tools.

The Situation

During an incident at a suburban residence, a local HazMat team seized a small sample of what appeared to be street fentanyl. After an independent laboratory verified the presence of fentanyl, we were asked to participate in a technology comparison. We evaluated the effectiveness of three portable techniques: Raman, FT-IR, and high pressure mass spectrometry™ (HPMS).

Analysis by Raman

Raman spectroscopy is a go-to tool because of its high selectivity and ability to differentiate between 10,000+ different compounds through sealed packaging. However, Raman is primarily used as a bulk technique. This means a visible amount of sample is required to make the measurement and it is rarely suitable for detecting trace-level concentrations. Here, the Raman analysis failed as fluorescence interfered with the measurement and the estimated run time was upwards of 4 hours.

Analysis by FT-IR

Similar to Raman, FT-IR is more suitable for bulk material identification and is also highly selective. Here, FT-IR was only able to detect a carbohydrate, which serves as a cutting agent used to dilute highly toxic opioids. No fentanyl was detected using this technique, despite the fact that the FT-IR instrument was equipped with a library of fentanyl and its related analogues.

Analysis by HPMS

HPMS is a novel technology that powers the MX908. This analytical technique is both highly selective and sensitive, making it the technology of choice for a wide range of chemical threats. Here, a sample estimated to be in the low nanograms was measured on the MX908 using its Drug Hunter mode. The device was clearly able to identify fentanyl in the presence of the cutting agent in less than 60 seconds.

MX908's new Drug Hunter mode unlocks additional resolving power from the device's existing hardware to dramatically upgrade selectivity, which provides first responders with optimal detection and identification capabilities for a subset of the devices target list, including a broad range of fentanyls, opioids, and amphetamines.

908devices

CASE STUDY
Analysis Comparison of Street Fentanyl

About MX908
MX908™ leverages high-pressure mass spectrometry to deliver dramatically enhanced sensitivity and broader threat category coverage. This down-range tool increases mission support with unmatched flexibility and trace detection power for responders in priority drug, chemical, explosive and high-threat hazmat scenarios. MX908 lightens the overall technology burden by displacing other less selective technologies from the response toolkit.

About Mission Modes
The MX908's Mission Modes are specialized hardware and software configurations for enhanced operational performance under specified mission objectives. Drug Hunter, which was used in this analysis, is a mission mode for the detection and identification of drugs and pharmaceutical-based agents (PBAs) including fentanyl and fentanyl-analogues, heroin, cocaine, and amphetamines. When Drug Hunter is selected, the MX908 hardware reconfigures to provide optimal efficiency and mass spectral selectivity using sequential fragmentation to selectively create and confirm the expected mass fragments of the drug targets of interest.

"The opioid abuse crisis is rapidly spreading throughout communities across the country. In 2015 alone, opioids were involved in the death of 33,091 US citizens – a number that has quadrupled since 1999[1]."

The abuse of fentanyl and other opioids is a crisis within communities all across the country. Due to their potency, fentanyls can be present at very low levels and still pose a severe hazard to first responders and civilians alike.

As demonstrated in this case study, Raman and FTIR are not practical technologies for the detection of trace substances. While great for bulk material identification, they cannot detect minor mixture components below the 5-10% level.

Here, HPMS demonstrated the capability to positively identify a trace amount of fentanyl in less than 60-seconds. The sensitivity of MX908 enables the identification of fentanyl and its analogues down to 0.1%, even in a complex mixture.

REFERENCES: 1. https://www.cdc.gov/drugoverdose/epidemic/index.html. **2.** https://www.cdc.gov/nchs/data/databriefs/db294_table.pdf#page=4

MX908 Mission Modes enhance performance using specialized software configurations to optimize operational performance for mission objectives.

Drug Hunter: is a mission mode for the detection of drugs and pharmaceutical-based agents (PBAs) such as: fentanyl and fentanyl-analogues, along with other high priority drugs-of-abuse.

Explosives Hunter: is a mission mode for the detection of priority threats from military and commercial grade explosives, to homemade energetics and relevant precursors.

CWA Hunter: is a mission mode for the detection of priority chemical warfare agents, including real-time vapor quantification.

908 Devices
+1.857.254.1500 | M908@908devices.com
www.908devices.com

908devices