

Trace vapor generator for detecting explosives, narcotics

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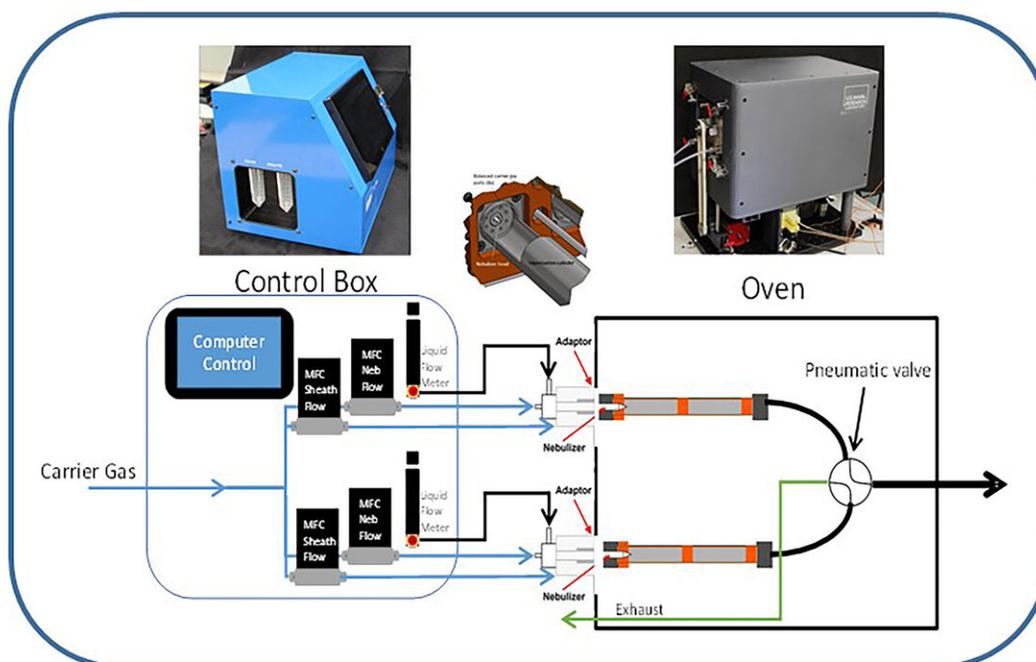


Diagram illustrating the flow path of the analyte in an aqueous solution as it moves from the sample introduction vessels on the Trace Vapor Generator for Explosives and Narcotics (TV-Gen) control box, through the nebulizer interface, where the analyte is vaporized and continues through the TV-Gen oven, dual manifold system. Credit: Diagram provided by U.S. Naval Research Laboratory

Trace vapor detection technologies are crucial for ensuring reliable and safe detection of explosives and illegal drugs. Researchers from the U.S.

Naval Research Laboratory have developed a compact testing device called the Trace Vapor Generator for Explosives and Narcotics (TV-Gen), which is portable and can be used for non-contact sampling of these vapors.

In the journal *Review of Scientific Instruments*, the team reports the TV-Gen can accurately generate trace vapors of low vapor pressure compounds, such as explosives or narcotics, and can produce vapors in complex backgrounds.

"We can use the TV-Gen in the early stages of sensor development, where the developer is just determining if their proposed sensing material responds to a target analyte, all the way to determining instrument and assay limits of detection for hand-held trace detectors and hyphenated instrumentation," said author Braden Giordano.

This [device](#) is the next generation of the Test Explosive Sensor (TESTbed) developed for the Department of Homeland Security, with advanced vapor mixing and a smaller footprint, making transport to other laboratories or into the field possible.

"The TV-Gen is significantly smaller than the TESTbed, and while providing only a single sample port for device evaluation, it maintains or improves upon the older systems' performance metrics," said Giordano. "It can fit on a small cart, so you can bring the vapor source to your technology, not the technology to the vapor source."

The device can provide a stable vapor for several hours and can rapidly switch between a clean vapor stream and an analyte vapor stream while matching humidity.

"An interesting application that will be taking place this year is testing detector canines to get quantitative measurements of olfactory detection

threshold and, potentially in the future, be able to compare canines directly to instrument for the first time," said Giordano.

The researchers hope to continue meeting the needs of the vapor detection community by expanding the library of vapors and exploring methods to maximize [vapor](#) generation efficacy at lower operating temperatures.

More information: "Trace Vapor Generator for Explosives and Narcotics (TV-Gen)," *Review of Scientific Instruments* (2020).
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