

Electronic Noses Vs Bomb/CA Specific Detectors

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Consider the premise that an electronic nose is more than a bomb detector because it sees (detects) all chemical compounds in an odor, fragrance, or vapor. It then follows that a bomb/CA detector is not an electronic nose because it is blind to chemical compounds, which are not known explosives or chemical agents. Potential users of these two instruments frequently are confused by this distinction.

Sensitivity is not the issue since electronic noses like the zNose™ and bomb detectors like ion-mobility spectrometers (IonTrack IMS) have essentially equal speed and sensitivity to the compounds they are designed to detect. Specificity is the issue and users should understand the different role each type of instrument can undertake as part of an integrated security, force protection, or general law enforcement screening or investigative mission.

A bomb detector is designed to answer the question, what something is not. For example, it is not a bomb. It provides little or no information on the identify of the object producing the odor or fragrance. Conversely an electronic nose answers the question what something is. For example, it is jet fuel. An electronic nose sees everything and misses nothing. A bomb detector is best used to detect trace amounts of explosives in the presence of high background chemical vapors. An electronic nose is best used to characterize and recognize objects by detecting the principal chemical components of the object's aroma. An electronic nose is limited in its ability to detect trace levels of explosives or chemical weapons by its inherent and finite dynamic range. Its full sensitivity can be best used when there are no high-concentration background chemicals. Therefore, an electronic nose would work well screening the relatively clean air of a commercial office building, military headquarters and other enclosed spaces such as a shipping container.

Combining these two technologies is complimentary and not exclusive. Fusion of two dissimilar technologies into a hyphenated system produces the maximum amount of information upon which to base a decision and thus is a viable approach for minimizing or resolving the problems of false alarms in screening systems based upon a single detector. Electronic noses have the ability to recognize an almost limitless number of chemical vapor threats while bomb/chemical agent detectors provide the ability to detect specific target chemicals at trace levels while not being affected by high ambient concentrations of non-target compounds. Electronic noses provide a different screening capability with inherently more information gathering power than bomb detectors and help to resolve ambiguities by using a library of aroma signatures. The zNose™ uses a patented method of olfactory images called VaporPrints™. These high-resolution 2-dimensional images are object specific and determined solely by an object's aroma chemistry.

Electronic noses are best used as investigative rather than screening tools. Electronic noses are well suited to applications involving fire or forensic investigations, contraband materials, and counterfeit products or hazardous chemicals. All zNoses™ use a common library, which is the same for all other zNoses™. The library can be updated and new vapor threats or target VaporPrint™ signatures disseminated electronically across a worldwide network of zNoses™. For example, the vapor signature (VaporPrint™) of a letter containing anthrax spores can be measured in a secure laboratory and then used to update the common library of all other zNoses™. This eliminates the need for security personnel to use dangerous or difficult to obtain calibration standards.