

Benzodiazepine Detection Using an Agilent Resolve Handheld Raman Analyzer

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Safe identification of novel illicit tranquilizers

Benzodiazepines are mild tranquilizers that were developed in the 1960s to treat anxiety. When taken as prescribed, licensed variants are unlikely to cause addiction. However, misuse of these drugs can lead to dependence and overdose.¹ This is a particular hazard with novel synthetic variants of benzodiazepines that exhibit similar effects to the licensed drugs but can be stronger. Benzodiazepines are increasingly found on the illicit drug market in North America and Europe.^{2,3} They are available as powders, tablets, or liquids and have been found with other psychoactive substances, including illicit opioids and nitazenes.⁴ The variable potency of these novel drugs presents a health risk in the drugs' pure form, and the danger of contamination and misrepresentation as "legal highs" means that the risk remains when packaged for sale.

The **Agilent Resolve handheld Raman analyzer** uses **spatially offset Raman spectroscopy (SORS)** technology to identify hazardous materials, explosives, and narcotics concealed behind single and multiple barriers. These barriers can include colored and opaque plastics, glass, paper, cardboard, wrapping, and fabrics. The combination of SORS, high data quality, low fluorescence interference, and a spectral library that is continuously updated with new psychoactive substances makes the Resolve a powerful tool in the detection and identification of controlled substances. As of library version 41, over 60 different benzodiazepines can be identified with the Resolve.

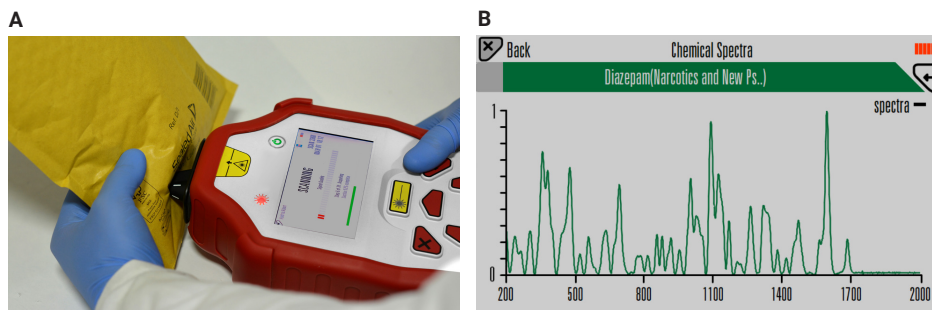
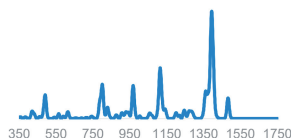
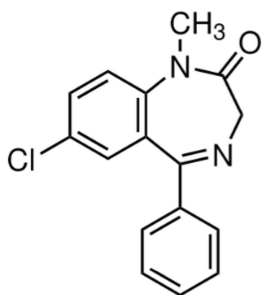


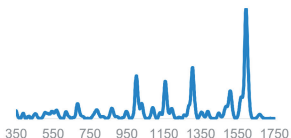
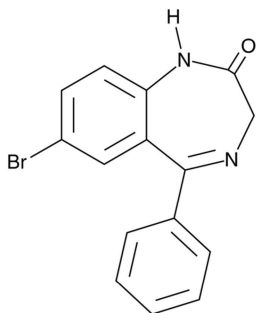
Figure 1. (A) Agilent Resolve handheld Raman analyzer. (B) SORS spectrum of diazepam in the Narcotics and New Psychoactive Substances spectral library.

Structures and Raman spectra of some benzodiazepine materials included in the Resolve library

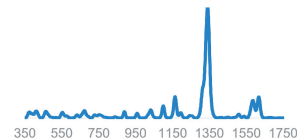
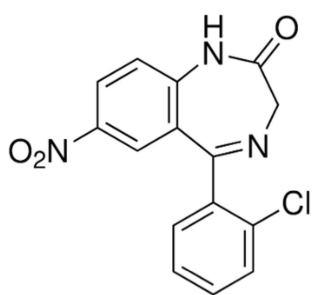
Diazepam



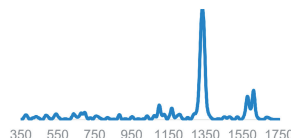
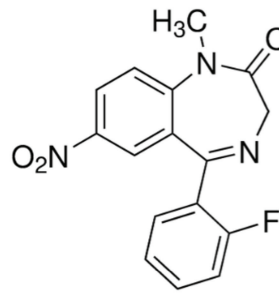
Desalkylgizazepam



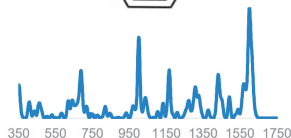
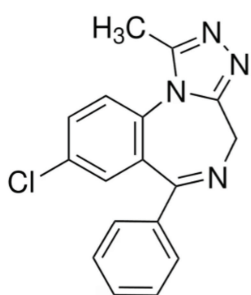
Clonazepam



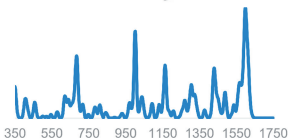
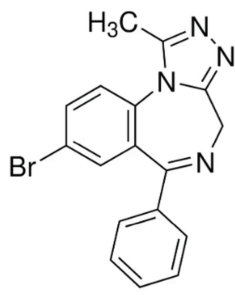
Flunitrazepam



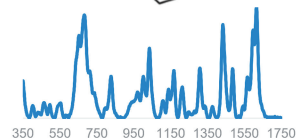
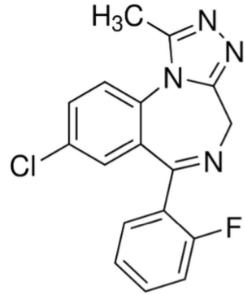
Alprazolam



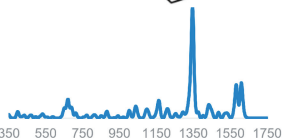
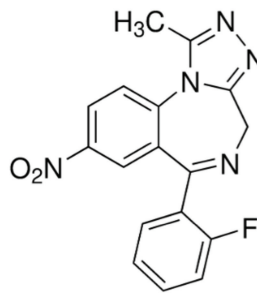
Bromazolam



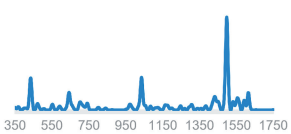
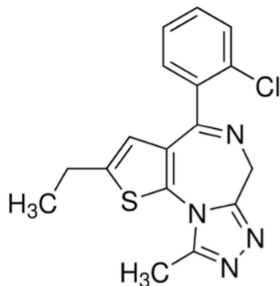
Flualprazolam



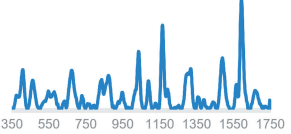
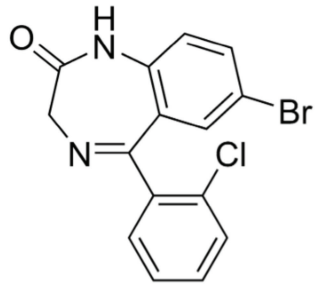
Flunitrazolam



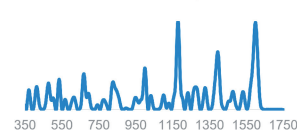
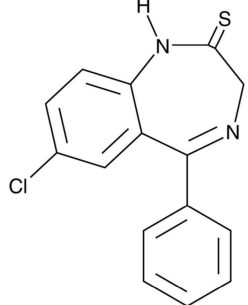
Etizolam



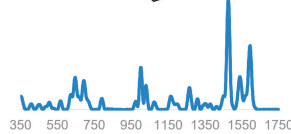
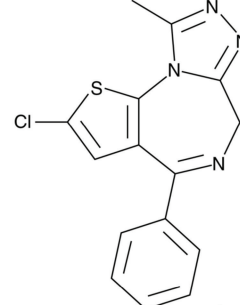
Phenazepam



Thionordiazepam



Deschloroclotizolam



Fast, direct identification of narcotics

The Resolve handheld Raman analyzer with SORS and the "Narcotics and New Psychoactive Substances" spectral library can be used for the identification of narcotics in the original packaging. Direct analysis using the Resolve minimizes the risk of accidental exposure of law enforcers to the compounds.

References

1. Cleveland Clinic. Benzodiazepines: What They Are, Uses, Side Effects & Risks. <https://my.clevelandclinic.org/health/treatments/24570-benzodiazepines-benzos>
2. EUDA. Infographic: benzodiazepines notifications to the Early Warning System and seizures, **2022**. https://www.euda.europa.eu/media-library/infographic-benzodiazepines-notifications-early-warning-system-and-seizures_en
3. Canada Public Health Infobase, Drug Analysis Service and Cannabis Laboratory. Analyzed Drug Report, June 15, **2024**. <https://health-infobase.canada.ca/drug-analysis-service/analyzed-drug-report.html>
4. Drug Enforcement Administration, Diversion Control Division, Drug & Chemical Evaluation Section. Benzimidazole-Opioids, January **2024**. https://www.deadiversion.usdoj.gov/drug_chem_info/benzimidazole-opioids.pdf

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