



Point of Origin Profiling of Narcotics and Counterfeit Pharmaceuticals

Avalon Instruments

Raman Spectra has proven to be a powerful technique for analysis and identification of illicit and contraband and counterfeit materials. Now automated techniques open Raman analysis up to seizure analysis, allowing for an order of magnitude more information to be extracted from seizures of Narcotics or counterfeit pharmaceuticals.

Sample ID

Knowing the identification of a material using Raman analysis is simple, the material simply needs to be placed in the spectrometer and the analysis is fully automated. There is no sample preparation; the Avalon RamanStation can automatically position the sample for optimum spectral collection and automatically calculate the optimum analysis time. The collected spectrum is then automatically searched through a library of known substances. Mixtures are no problem and sample fluorescence is typically dealt with using Avalon's automated fluorescence removal techniques.

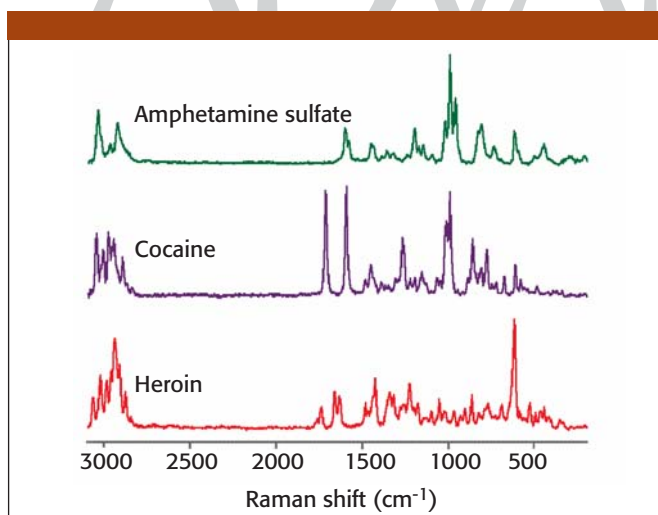
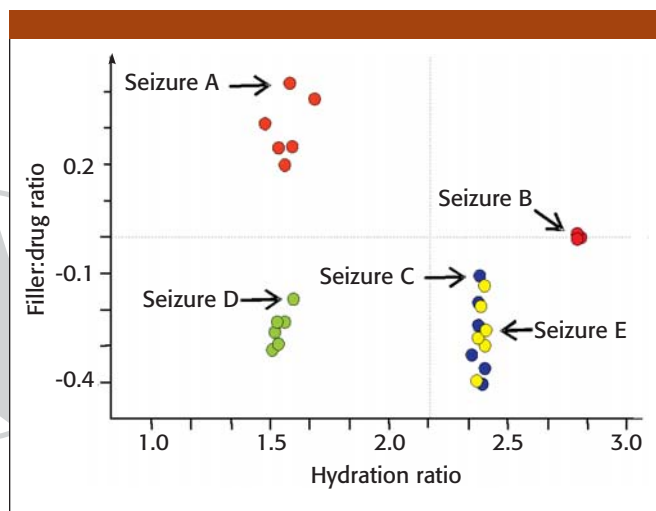


Figure 1. Point of Origin profiling

Point of Origin Profiling

Sample ID is essential but, automatically analyzing large volumes of seized materials gives access to another level of information. Avalon's Insight software can automatically process batches of spectra and search for similarities and differences between tables, the data is then used to generate scatter plots.



Any overlap of these clusters indicates that these seizures have a common point of origin. And of seizures overlap with clusters from samples found in a drug manufacturing lab then past seizures can also be referenced back to this location.

Forensic Intelligence Gathering Using Cluster Analysis

The hidden intelligence information in these scatter plots is complex and this application note only touches the surface of the information hidden within the spectra. Among other things these scatter plots tell us a lot about the manufacturing facility and raw materials, tight clusters are pharmaceutical grade blends, and most probably manufactured using pharma grade equipment, loose clusters are crudely manufactured and possibly made using kitchen utensils.

Conclusion

The information gained from automated high throughput Raman analysis can be very powerful. Cluster analysis has shown to yield rewards during suspect interrogation and the insight gained from this form of analysis can help law enforcement officers better understand drug trafficking routes.

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