Introduction

Pseudoephedrine and ephedrine are stereoisomers that present a significant challenge to the modern forensic laboratory. Stereoisomers are molecules with the same chemical formula, but a different three-dimensional arrangement. These similarities make it nearly impossible to differentiate using retention time or GC-MS. On the other hand, IRD 3 spectra allow for the rapid determination of both compounds. IRD spectra are highly reproducible, and the ability to library search compounds ensures accuracy when dealing with stereoisomers. Presented below are the individual spectra for both compounds and an overlay of the spectra to help highlight the differences. After GC separation both spectra were searched against forensic drugs libraries and results of higher than 99.4% were achieved.

Product Overview

The IRD 3 is designed from the chromatographer’s point-of-view and is unique in that it was designed to be used directly with a Gas Chromatograph (GC), and not just as a lab top FTIR. The IRD-3 seamlessly integrates the separating power of the GC with the molecular identification of an FTIR.

The IRD 3 is the perfect tool for the chromatographer looking to obtain more information about unknown samples. Using a heated light pipe flow cell, the sample is kept in the vapor state while interacting within the IR band width. Keeping the molecular geometry intact during analysis provides unique and highly reproducible spectra.

Parameters and Results

For comparison purposes, neat standards of both compounds were prepped and injected. Figure 1 shows individual spectra and the structures of both ephedrine and pseudoephedrine. Visual comparison of the two spectra shows a significant difference, especially in the region from 1500-1000 wavenumbers. Another measurable difference is seen in the 3300 region. Figure 2 shows the two spectra in overlay mode. In this view, the differences in the two spectra are observed much easier.

Key Features

- Vapor phase FTIR for use with GC and GC-MS
- Low Maintenance with no moving parts
- Smallest footprint available saves bench space
- Dedicated vapor phase libraries
- Single sequence table operates the entire GC-IRD system
Conclusion

This example illustrates the tremendous power of the IRD to distinguish between isomeric compounds. It also points out the excellent complementary information that the IRD and MSD provide. The combination of these two instruments provides an exceptional capability for qualitative analysis at a very high confidence level.