IRD 3 Application Note

Pseudoephedrine and Ephedrine

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, the IRD 3 products spectra that 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 greater than 99.4% were achieved.

Product Overview

The IRD 3 is designed from the chromatographer's point-of-view and is the only analytical infrared instrument that seamlessly combines the separating power of the Gas Chromatography with the molecular identification of FTIR.

- Dedicated FTIR for use with GC
- Low maintenance and easy to use
- Small footprint
- Software interfaces with GC control software
- Seamless integration with MS

The IRD 3 is the perfect tool for the chromatographer looking to obtain more information about unknown samples. Using a heater light pipe flow cell, the sample is kept in a vapor state while interacting with IR. This allows the molecules to freely rotate in a low energy environment. Keeping the molecular geometry in tack 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 significant difference, especially in the region from 1500- 1000 wavenumbers. Another measurable difference can be seen in the 3300 region. Figure 2 shows the two spectra in overlay mode. In this view the differences in the two spectra can be observed much easier.

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Figure 1.

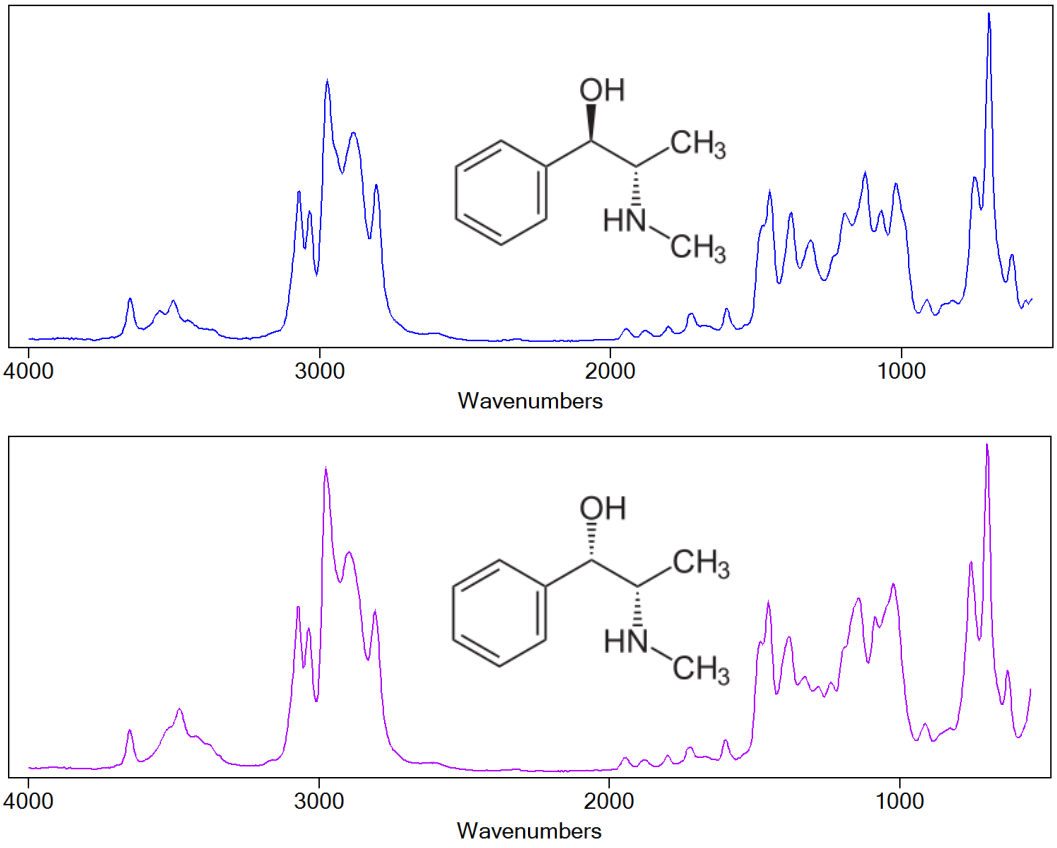
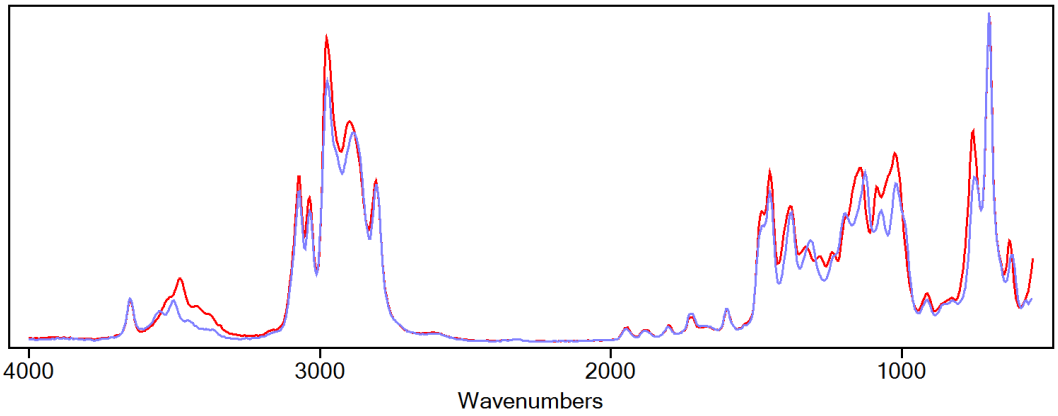


Figure 2.



Conclusion

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