

IRD 3 Application Note

Fentanyl

Introduction

Fentanyl is an opioid and a Schedule II controlled substance used primarily as a pain medication. The biological effects of fentanyl are similar to those of heroin. Fentanyl analogues may be hundreds of times more potent than street heroin and produce more respiratory depression making it much more dangerous than heroin to users. Many overdoses are initially classified as heroin overdoses. In 2016, fentanyl and its analogues caused over 20,000 deaths in the US, a rise of 540% over the previous 3 years.

Fentanyl and its analogues present a unique challenge for forensic labs. Illicit versions of the synthetic opioid fentanyl at the same level as heroin, allowing criminal prosecution of anyone who possesses, distributes or manufactures illicit versions of the drug.

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

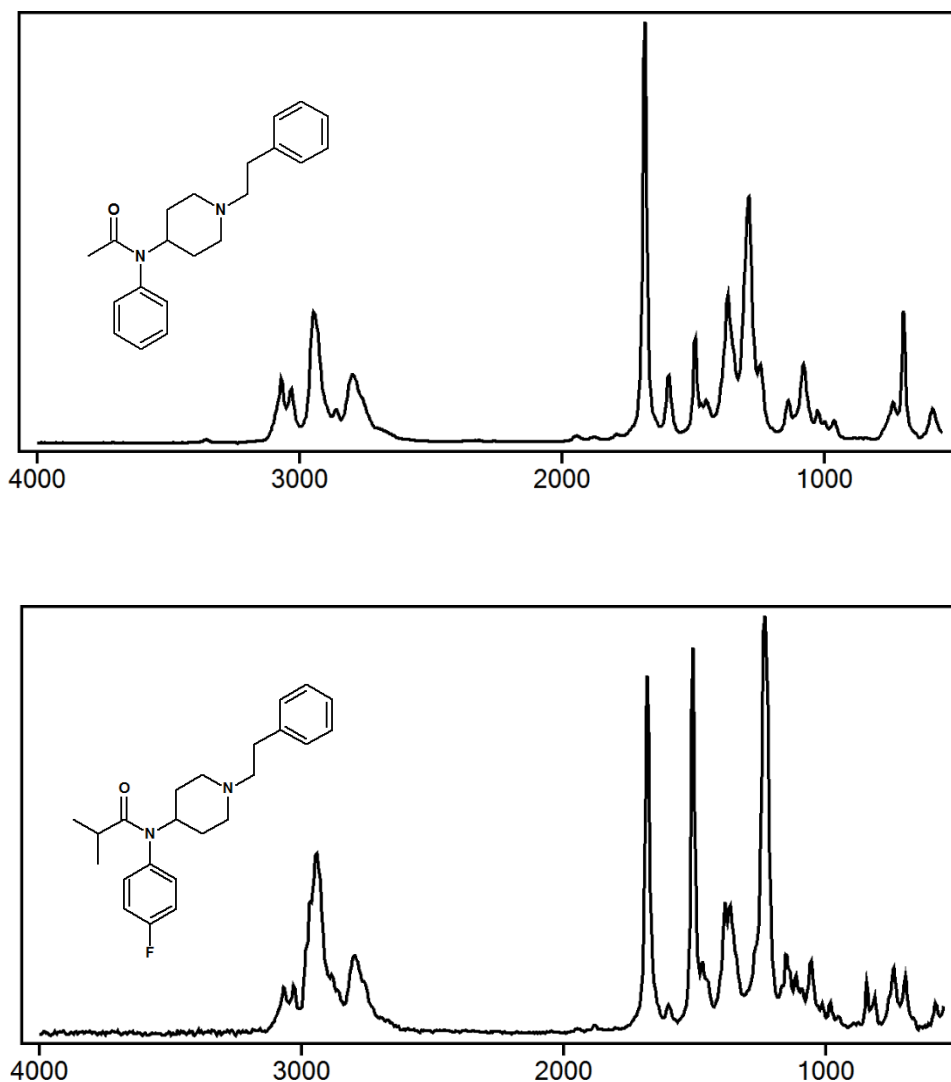
The IRD 3 is the perfect tool for the chromatographer looking to obtain more information about unknown samples. Using a heater light pipe flow cell, the sample is kept in a vapor state while interacting with IR. This allows the molecules to freely rotate in a low energy environment. Keeping the molecular geometry intact during analysis provides unique and highly reproducible spectra.



Results

Figure 1 shows the IR spectra for acetyl fentanyl and *p*-fluoroisobutyryl fentanyl collected on the IRD 3. and confirms the spectra are easily differentiated for these similar molecules. The figure also includes the structure of each molecule and the region of the IR spectra from 1500-1000 wavenumbers. Much of the IR spectra are identical but the region shown has distinct differences that are highly reproducible. The spectra for 2,3 has a single peak at 1446 that corresponds to a doublet in the 3,4 spectra. The reverse is true for the 3,4 spectra, a large single peak is present at 1246 and a doublet is present at this location on the 2,3 spectra.

Figure 1.



Conclusion

For samples as similar as acetyl fentanyl and p-fluoroisobutyryl fentanyl differentiation by GC-MS is impossible. The IRD 3 is the perfect tool to assist the chromatographer in making a positive ID. The IRD 3 uses 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 a unique and highly reproducible spectra.